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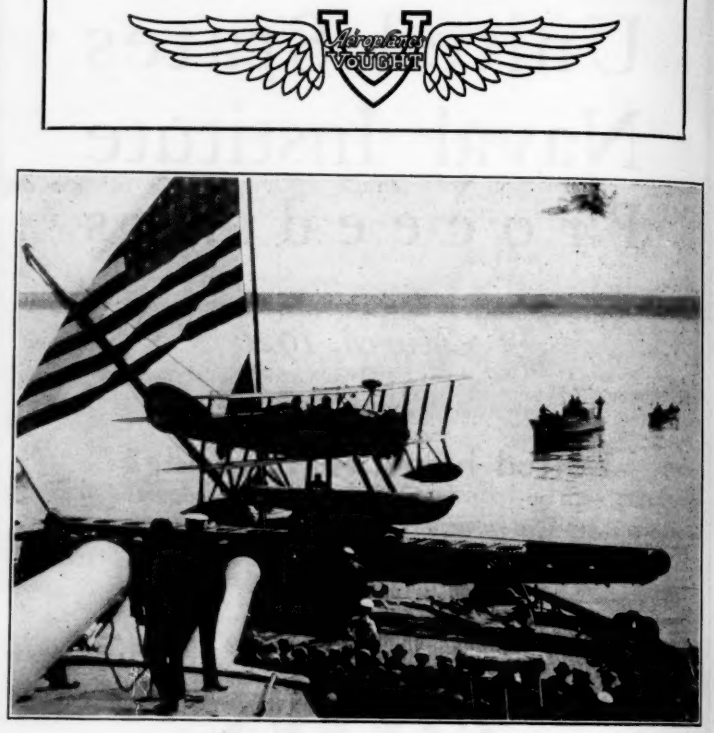

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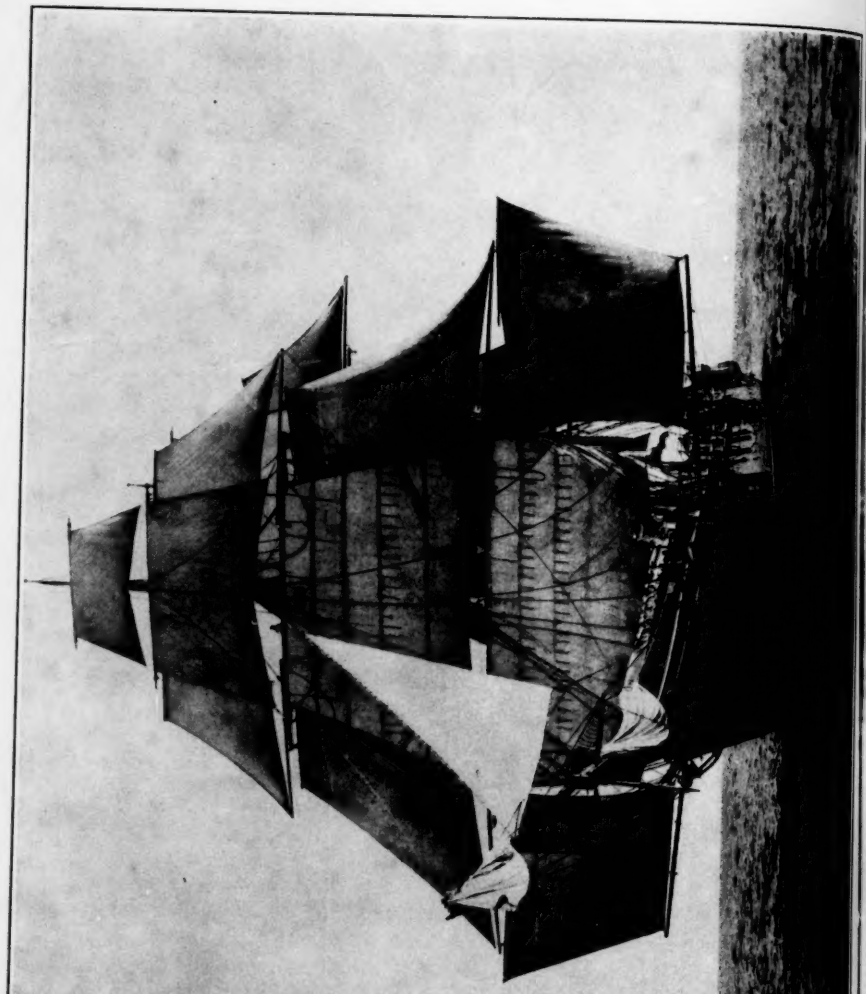

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PRIZE ESSAY 1926

THE BATTLESHIP AND ITS USES

BY HECTOR C. BYWATER

"He that commands the sea . . . . commands the world itself"

WHAT is the status of the battleship under existing conditions, and what is it likely to be ten or twenty years hence, assuming a normal rate of progress in the science of naval warfare? Is this type of ship already obsolete, or is there substantial reason to suppose that it will become obsolete within the near future? These are questions of more than academic interest. So long as they remain unanswered, it will be difficult for any one of the great maritime powers to map out a definite and systematic policy of sea defense. In 1931 the initial period covered by the Washington compact will lapse, leaving each of the signatory powers free to resume the construction of capital ships, albeit on a limited scale. It is not enough that the executive heads of the United States, the British, and the Japanese navies are satisfied that the capital ship is, and will remain, the strongest exponent of armed force at sea. Public opinion is a factor of weight in the molding of defense policies, particularly in the case of the United States and Great Britain, and if the public in either country made up its mind that a certain type of ship had ceased to be worth while, funds for the perpetuation of that type would be withheld, let the experts plead as they might.

Now on both sides of the Atlantic detractors of the battleship have already contrived by skillful propaganda to implant in the

public mind a prejudice against this type. It would be difficult to over-estimate the effect of lay opinion of the anti-battleship crusade which Sir Percy Scott carried on almost to the day of his death. Several of the most widely-read newspapers in England have assumed an attitude of hostility to the dreadnaught, and in recent Parliamentary debates on naval affairs the opposition to further expenditure on this class of ship has made itself felt with growing strength. That practically every journal which commented on the launch of the British battleship *Nelson* last September should have assured its readers that this vessel and her sister, *Rodney,* would, in all probability, prove to be the last of their line, is a fact of some significance. In the United States air enthusiasts have proclaimed the demise of all surface fighting ships so often and so loudly that a pure hypothesis is coming to be invested with the dignity of an established truth. What, then, is likely to be the position in 1931, at which date the maintenance of treaty ratios will necessitate the building of new capital tonnage by all the powers concerned? Proposals to lay down such tonnage are certain to be resisted by a large body of public opinion, perhaps by a majority, and it would be hopeless for the naval authorities to try, at the eleventh hour, to demonstrate the actual need of new ships. It is true that the simultaneous disappearance of all such vessels from the world's navies would have no effect on relative strength, provided the treaty ratios were adhered to in respect of other craft—which, by the way, is not the case at present. If, on the other hand, the capital ship were discarded by one nation and retained by another, the balance of power would be rendered vague and uncertain, to say the least of it. From every point of view, therefore, it seems expedient to define, as clearly as may be, the present and future rôle of the battleship in strategy and tactics.

This the writer proposes to attempt by an objective survey of the data available, with special reference to questions of design, construction, offensive and defensive attributes, as well as the technique of weapons which, as many critics claim, could be employed against the battleship with deadliest effect. Hitherto this aspect of the problem has been largely neglected in public discussions. The ordinary newspaper reader has no relish for technicalities, and since it is the business of editors to keep their readers interested, they cannot be blamed for giving more promi-

nence to picturesque indictments of the battleship than to sober and reasoned arguments for the defense. Yet, in the writer's judgment, the problem is fundamentally a technical one, and cannot be rationally approached from any other angle. It is so easy to say, and is so often said, that "aircraft can sink the mightiest dreadnaught afloat." There is, of course, a substratum of truth in the statement, but as a general proposition it is entirely misleading. Of broader but equally deceptive application is the further claim that aircraft and submarines together will drive every surface ship from the sea. This is mere prophecy, not only unsupported by a jot of tangible evidence, but running counter to actual experience. To abandon tried principles in favor of dubious theories is always unwise, but to do it when so vital a concern as national defense is at stake would surely be worse than foolish.

The modern battleship incorporates the ultimate degree of naval artillery power. It is at the same time the least vulnerable of all ships to this form of attack. It is expressly designed to deliver and to withstand harder blows than any other type of ship. Among surface craft it is admittedly supreme. Yet its critics assure us that the battleship is a slothful, clumsy, and feeble giant, an emasculated Goliath, impressive only because of its bulk, and entirely at the mercy of the punier but more agile opponents who would swarm about the inert monster and sting it to death. Let us examine this theory in the light of acknowledged fact. The modern dreadnaught, so far from being slothful, can move through the water at a very respectable pace. In the British Navy there are dreadnaughts which steam at 31 knots—equal to 35.7 land miles an hour. They are, therefore, appreciably faster than the swiftest liners of today, which are popularly known as "ocean greyhounds." The slowest battleships now in service are good for 21 knots. But for the Washington Treaty restrictions on displacement, dreadnaughts with a speed of 35 knots would already be afloat. The battleship is able to maintain a high rate of progress for long periods; at lower speeds it can make a non-stop voyage of 10,000 miles or more. In the hands of a capable navigator it can be maneuvered as easily and surely as a yacht. To label such a vessel slow and clumsy is an abuse of words. Its principal arm of offense is the great gun, of which it may have eight or twelve pieces, according to caliber.

So much has been heard about the terrible havoc wrought by torpedoes and air bombs that the destructive power of heavy naval ordnance is liable to be overlooked. Accepting the U.S.S. *Colorado* as a typical battleship of modern, though not ultra-modern design, we find her mounting a main battery of eight 16-inch 45-caliber guns. Each weapon is over 60 feet long, weighs 105 tons, and discharges a projectile of 2,100 pounds with an initial velocity of 2,800 feet per second. The energy developed at each discharge would lift a weight of 98,400 tons one foot above the ground. If a gun of this type were on view at a public exposition its tremendous size and power would amaze all beholders. Mounted in a turret on shipboard it seems to be dwarfed by the size of the vessel itself, and the prodigious destructive energy latent within this massive tube of steel is less evident to the casual eye. Notwithstanding the great weight of gun and projectile, one round can be fired every 45 seconds, and this rate of fire can be kept up so long as the target continues to bear. Thus, the *Colorado* going into action with her eight 16-inch guns loaded, would deliver forty rounds in the first three minutes; and since 7½ tons of shell is hurled at each salvo, her volume of discharge in that brief space of time would amount to 37 tons. This torrent of fire could be directed against any target up to eighteen miles, at which range, with well-trained control officers and the latest director apparatus, a fair percentage of hits might be expected. At shorter ranges a much more accurate fire could, of course, be delivered. As the 16-inch shell has great penetrative power—at 9,000 yards it will pass through 18 inches of the hardest armor plate—none save the most heavily armored ships can resist its thunderbolt impact, and each shell that drives into the vitals of the target will explode there with the force of a large-caliber bomb. It is therefore not difficult to visualize the extraordinary sum of destructive power that a squadron of present-day dreadnaughts could exert. Nothing has been said of the secondary armament of twelve or sixteen 5-inch rapid-fire guns, each pouring forth 50-pound shells at the rate of ten per minute; or of the eight 3-inch anti-aircraft guns which fire still more rapidly.

So much, then, for the battleship's powers of attack. Her combination of high mobility and long-range, hard-hitting artillery makes her a tactical unit of incomparable value under the ordinary

conditions of squadron warfare. Her sole *raison d'être* is to serve as a floating automotive platform for the heaviest ordnance. The big gun, despite all assertions to the contrary, is at once the most accurate and least resistible weapon of naval combat. The torpedo is a formidable arm, but in range and precision it is far inferior to the gun, and the damage it causes may be localized by devices to which reference will be made in due course. Air bombs of very large caliber may inflict mortal injury on the strongest ship, provided enough of them can be dropped in exactly the right place. A few direct hits from these bombs might wreck the upper works of a dreadnaught, but whether they would disable the ship as a fighting unit has yet to be proved. Heavy bombs detonating alongside would produce much the same effect as torpedoes, the damage from which may be localized. It is, however, important to note that these very heavy bombs cannot be transported by airplanes operating from the deck of a ship; they can only be used by large machines flying from a shore base. Bombs of the maximum caliber that ship airplanes are able to carry would inflict only superficial injury on a battleship. They are much less to be feared than direct hits with heavy shell. Nor must it be overlooked that the menace of air attack is of too recent an origin for ship designers to have explored all the possibilities of defeating it. This problem, however, is closely related to that of protection against curved-trajectory gunfire. A ship well protected against plunging fire would have little to fear from bombs.

It is frequently claimed that gas bombs would speedily disable the greatest dreadnaught by putting the entire crew out of action. In point of fact, the gas peril has long been recognized by naval authorities, who have taken measures to avert it. Certain of those measures, and perhaps the most effective of them, are confidential; but it may be said that the equipment of every officer and man on board a battleship going into action tomorrow would include a gas mask, so designed as not to interfere with the performance of his duty, whether it be reading of the figures from a rangefinder, working an instrument in the plotting room, or controlling an oil-jet under a boiler. Actual tests have been held to determine whether the fighting efficiency of a ship would be impaired under such conditions, and the result in every case has justified a negative answer. Further, it is quite feasible to construct gun-turrets, plotting-rooms, and other enclosed spaces vital to the working of

the ship in action which would be virtually gas-proof. This is an improvement which may already have been introduced into ships now afloat; it will certainly be a feature of future dreadnaughts. Phosphorus, incendiary, asphyxiating, or explosive bombs—all can be countered by the ingenuity of the ship designer if he is allowed a reasonably free hand.

Nor is he dismayed by the menace of torpedo or mine, neither of which presents an insoluble problem. Before the World War the power of such weapons was underrated, and consequently the protection of ships from their attack did not receive the attention it deserved. It was, therefore, not surprising that battleships of the older class should almost invariably have succumbed to the powerful torpedoes and mines which were employed during the war. Even the British dreadnaught *Audacious* foundered after striking two mines. But to cite these incidents as proof that the modern battleship is too vulnerable to be worth perpetuating is to ignore the remarkable progress which has since been made in design and construction. No sooner did the full extent of the underwater peril become manifest than naval architects set to work on the problem. Their labors culminated in the "bulge," a device that proved successful beyond all anticipation. Many bulged ships were torpedoed during the war, but not a single one was sunk. Perhaps the most striking example of endurance to punishment was afforded when the British monitor *Terror,* of 8,000 tons, was attacked by German destroyers off the Belgian coast. Although hit by three torpedoes in succession, she remained afloat and was able to proceed into port under her own steam. In a few weeks the damage was repaired and the ship again in service. On another occasion a sister ship, the *Erebus,* was struck by a distance-controlled motor boat, carrying a charge of 500 pounds of T.N.T. which detonated amidships. In this case the bulge so effectively absorbed the shock that the hull proper sustained no injury whatever, not even a leak being started. As the explosion may be said to have resembled that of a large-caliber bomb falling alongside, it is a fair inference that bulged ships are less likely to be disabled by air attack than others not so equipped.

Since those early days the bulge has been much improved. Subdivision of the hull below the waterline has also been extended. A vessel equipped with these devices is, therefore, in a much better position to withstand underwater attack than her predecessor

of ten years ago. In vessels of the *Maryland* class there are so many longitudinal bulkheads between the vital spaces of the ship and the outer skin plating that no outside explosion would be likely to inflict disabling injury. It is true that torpedoes and mines of greater power than those in use during the World War may be evolved. So far as the torpedo is concerned, however, a limit is set to its size by considerations of space and weight in the vessel carrying it. In 1918 Germany built a few destroyers to carry the new 23.6-inch torpedo, which was 26 feet long, weighed over two tons and had an extremely powerful warhead. But it was necessary to give these boats a displacement of 2,400 tons, which almost placed them in the light cruiser category. Experience has shown the 21-inch torpedo to be the heaviest that can be handled conveniently in destroyers and submarines of normal size. Larger torpedoes may come into service, but they are likely to be the exception, not the rule. To minimize the effect of mine explosions is a more formidable problem. Bulges offer no defense to a mine detonating beneath the keel, but even here the ingenuity of the designer promises eventually to overcome all difficulties. Recent experiments in France and Italy have shown that ships constructed with triple-bottoms can be endowed with an adequate degree of protection against mines. In this connection, it is of interest to note that the electric drive lends itself better than any other system of propulsion to that minute subdivision of hull which is the battleship's best insurance against underwater attack. The mine itself has lost much of its terror since the invention of the paravane. A ship armed with this gear can steam through a mine-infested area at small risk to herself. From this brief review of developments in construction, it will be seen that the menace of underwater attack is relatively less serious than it was, for while the methods of such attack have undergone little improvements in recent years, the defense has steadily increased in efficiency. It may be affirmed, therefore, as a fact beyond reasonable dispute, that the primacy of the battleship has not been seriously challenged by the submarine.

There remains the threat from the air. The possibly fatal effect of super-caliber bombs on the strongest dreadnaught is referred to above. Bombs of 1,000 pounds and upward do most certainly constitute a real danger to the battleship. Bombs of less weight than this, judging from recent trials, might cause some structural

damage and heavy loss among personnel, but probably could not put the ship out of action. Now it seems clear that a battleship could not be disabled, let alone destroyed, by bombing planes capable of being flown off a ship platform, since the useful military load of such machines is restricted, at present, to about 500 pounds. This being so, the battleship would incur serious danger from air attack only if and when it approached within range of the enemy's airdromes on shore. That range will naturally tend to lengthen as airplanes become more efficient. Machines are now in service with a flight endurance of 600 miles with a useful load of 1,500 pounds. For the present, therefore, we may take 300 miles as being the nominal distance from land at which a heavy bombing raid could be launched against warships. In practice, however, the distance would be considerably less than this, for the objective—unless it happened to be a ship or ships moored in a known anchorage—would first have to be located, and a ship under way might shift her position by as much as seventy miles during the time it took the attacking planes to come out from their base.

But assuming the objective to be duly found and the assault delivered, what are the prospects of success? A fleet that knew itself to be within range of shoreward air raids would probably have its own planes ready for counter-action. The aggressors would thus have to reckon upon meeting opposition before they got within range. Another disturbing element would be shell fire from below, and while it is customary for aircraft partisans to scoff at this form of defense, a well-directed cannonade from the numerous 3-inch high-angle guns—eight per ship—of a battleship division would scarcely conduce to accuracy of aim on the part of the bombers. Moreover, the targets would be traveling at high speed on an erratic course, perhaps emitting vast clouds of smoke. Peace-time tests offer no reliable indication as to the percentage of hits likely to be registered under the conditions here pictured. Bombs would be dropped more or less haphazard, and each plane, once its single bomb had left the trap, could take no further part in the attack. Is it seriously contended that by tactics such as these the ocean is to be swept clear of dreadnaughts?

Those who decry the battleship might reflect that its magazines contain from 600 to 800 projectiles equal in destructive power to heavy demolition bombs, and that these deadly missiles can be

hurled, not at random but with great precision, up to a distance of many miles. So far as all the evidence goes, a battleship would run an infinitely graver risk of destruction when engaged with an adversary of its own type than if it were being subjected to air attack. The *Ostfriesland,* a motionless, helpless target, was finally sent to the bottom after hours of bombardment from the air. At the Battle of Jutland three great dreadnaughts moving at high speed were sunk in swift succession by gunfire, two salvos at most being sufficient in each case to administer the death-blow. The most zealous champion of aircraft must perforce concede the enormous destructive power of the big gun, nor can he logically deny that this weapon, by reason of its superior precision, would hold its own against all other arms—provided the ship on which it is carried could be made virtually unsinkable. In effect, therefore, the whole of the present controversy on naval tactics centers in the possibility or otherwise of keeping the battleship afloat, and this in turn is a purely technical question. A ship armed with heavy long-range guns, and able to defy attack from below or above, would dominate the seas.

The claim here presented is twofold: first, that battleships of the newest type, *e.g.,* the *Maryland* and sisters, the British *Hood* and *Nelson* class, and the Japanese *Nagato* class, are so constructed that they would be difficult to sink, or even to disable, by torpedoes or air bombs; second, that future battleships could be endowed with a higher degree of protection by accepting a reduction in speed and weight of battery. Before proceeding to examine the strategical and tactical functions of the dreadnaught, it may be of interest to consider the possible lines of structural development. These will be governed, in the main, by the progress of submarine and aerial warfare. Heavier torpedoes and air bombs will necessitate an increase in the resisting power of battleships. As we have seen, the danger of plunging fire from heavy guns is already causing naval architects to pay more attention to horizontal armoring, which would be equally effective against bombs. The battleship of the future may have no belt armor at all, the whole weight of protective plating being put into a steel carapace enclosing all the vital parts, such as machinery and magazine spaces. Warship design is essentially a matter of compromising weight. High speed demands a generous margin of weight for machinery, and if a powerful armament is also specified, the surplus left over

for armor is necessarily small. Conversely, if a moderate speed be accepted, the ratios of weight available for battery and armor are higher. If moderate speed is combined with a reduction in battery, the percentage of weight that can be devoted to protection will be very large.

To take a few typical battleships of the present day: in the British *Iron Duke* and *Royal Sovereign* the percentage of weight due to protection is thirty-two. In the *Queen Elizabeth* it is thirty-one. In the *Hood,* which is reckoned to be a very stiffly armored ship according to British ideas, the percentage is thirty-three and one-half. In American ships the percentage of protection to total displacement is slightly higher, viz., 35 per cent in the *Pennsylvania* and *New Mexico.* The disparity, such as it is, is due to the lower speed of the American ships. In battleships of the pre-dreadnaught era more weight was assigned to protection than is customary today. In American ships of that type this item accounted on the average for 38 per cent of the displacement; for the Japanese *Kurama* the figure was 40, and for the French *Henri IV,* a coast-defense battleship, it was as high as 46 per cent. This ponderous weight of armor and other protective devices was a striking tribute to the power of naval artillery; but the real interest of the figures lies in the proof they give that the existing standard of battleship protection could be substantially increased if the need arose. In a battleship of 35,000 tons displacement, of 20 knots speed, armed with six 16-inch guns, it would be possible to pre-empt 15,000 tons for protection. If a ship so constructed would not be absolutely unsinkable, she could at any rate stand much more punishment from gunfire, torpedo, or bomb than any battleship now in service.

A word must be said as to the possible influence of the Diesel engine on battleship development. Anything which tends to enlarge the cruising radius of a warship will obviously tend to increase its strategic value. The present type of battleship, propelled by steam, has a sea endurance of, say, 10,000 miles. In time of war the actual distance it could traverse without replenishing fuel would be considerably less than this, owing to the need for fast steaming in areas where hostile submarines might be encountered. As a result, the steam-driven battleship under war conditions, is, in a sense, tethered to its base, whence it dare not venture further than 2,000 or 3,000 miles. The same disability is,

of course, common to all naval steamships, among which, however, the battleship has the largest endurance. Still, it cannot wage war at any great distance from its base unless adequate fuel supplies are obtainable locally—that is, from an emergency base within the war zone. But if the cruising endurance of the battleship could be so extended as to make it independent of base facilities for weeks at a time, its efficiency as an instrument of aggressive warfare would be immeasurably increased. The substitution of oil-engines for steam plant may render this possible. Already, it is claimed, a Diesel installation could be manufactured for a battleship of the *Oklahoma* class (27,500 tons, 20½ knots), which would develop the same power as her present steam engines and, by economy in space, permit of the ship's fuel capacity being enlarged to 6,500 tons. This would endow her with a cruising range of 69,000 miles at 12 knots and 58,000 miles at 15 knots.[1] While some may consider these figures too optimistic, there is no doubt whatever that the Diesel battleship would have a radius greatly exceeding that of a steam-driven vessel.

Before leaving the technical aspect of the battleship problem it is desirable once more to emphasize the fact that nothing approaching finality has yet been achieved in the design and construction of such vessels. Even within the limits of tonnage imposed by treaty, marked improvement could be effected in protection and armament. If it can be shown that command of the sea depends in the last analysis on sheer fighting power, and, further, that the last word in naval combat rests with the big gun, then it would appear to be sound policy to sacrifice speed for the sake of increased gun-power and protection. For all-round utility a battleship of 18 knots speed, so constructed as to be well-nigh unsinkable, would be preferable to a faster but more vulnerable ship. Tactical exigencies may yet promote the building of heavy-armed battleships, virtually proof against torpedo and bomb, with moderate speed and a cruising endurance sufficient to take them around the globe. The advent of such craft would be likely to revolutionize present-day ideas of naval strategy, which are bound up so closely with problems of logistics.

We come now to the concrete issue: Is the battleship an indispensable unit in naval defense? Since those who maintain the

[1] *Vide* article by Captain A. M. Proctor, U. S. N., in the PROCEEDINGS for July, 1925. Page 1221.

negative view generally turn a deaf ear to arguments based upon past experience, holding that aircraft and submarines have radically modified the conditions of sea warfare, it becomes necessary to rest the case for the battleship upon presumptive premises. In so doing, however, we but follow the example set by air enthusiasts, whose contentions are based entirely upon hypothetical grounds. They assert, for instance, that battleships would be powerless to prevent an aerial invasion of the United States, which could only be resisted with effect by counter-action on the part of aircraft, supplemented, perhaps, by submarines. The prospective invader is presumably a power in Europe or Asia, since to visualize an attack of this kind as coming from the American continent itself would put too severe a tax on the imagination. As the range of aircraft is limited for all practical purposes to a few hundred miles, it follows that the projected invasion is primarily a naval undertaking; in other words, the aircraft which are to spread death and destruction in the cities of the United States must be brought across the sea in ships. An apology would be offered for stating this self-evident truth were it not that certain publicists, whose zeal for air-power clouds their judgment, have totally ignored the preliminary operations which alone would make air invasion feasible.

We will assume that the invading force starts across the ocean. It consists of aircraft carriers and their naval escort: battleships, cruisers, and destroyers. The sailing of such an armada could not be kept a secret, and news of its approach would be sure to reach Washington days before the actual attack could develop. Consequently, the American fleet would seek to intercept the hostile force and bring it to action on the high seas, before it came within air range of the coast. If the enemy force were defeated there would be an end of its mission: in any event, the damage it received in action with the American fleet would probably be such as to cripple its powers of mobility and compel it to retreat. It is an age-old maxim that no military descent can be made on an enemy's coast until his naval forces have been defeated or contained. When the objective of attack lies at a considerable distance across the sea, this axiom applies to aerial invasion no less than to an actual landing of troops, because in each case the invading force, whether it consists of troops or aircraft, has to be transported in ships. It is thus a demonstrable fact that the United States could not be

subjected to an air attack on a major scale except by an adversary who had gained command of the sea through defeating the American fleet or penning it inside its bases. Obviously, therefore, a strong and efficient navy is the only sure safeguard from foreign air aggression.

To prove this proposition it is only needful to consider the probable course of events if the United States, in deference to air-power doctrinaires, had scrapped its fleet and trusted exclusively to aircraft for defense. In that case an invading force from overseas could not be intercepted en route. There would be no means of discovering when and where it proposed to launch an attack, for the defenders, being without naval scouting vessels, would have to rely on aircraft reconnaissance, which is too limited in range, and much too subject to weather conditions to be dependable. The enemy could so time his movements as to arrive within air range of the coast before dawn, and then proceed to fly off his planes for an attack on New York, Boston, Philadelphia, or Washington, as the case might be. No warning would come till the raiding machines crossed the coast, by which time it would be too late to take effective counter-measures. Having unloaded their bombs the enemy planes would return to their fleet, which might be lying 200 or 300 miles off-shore, and before the American aviators could strike a blow in return it would have steamed out of range, perhaps to move in again under cover of night and launch a second raid at dawn. However strong the American air force was, it would be powerless in the face of tactics such as these. An enemy in command of the sea could appear, vanish, and reappear at any point along the United States seaboard, using his aircraft freely to raid such objectives as he chose, yet incurring no risk of counter-attack so far as his ships were concerned. Of course, this species of guerilla warfare would be unlikely to produce decisive results, for which reason it probably would not be attempted; but the hypothetical case is presented as an answer to those who maintain (1) that the United States is exposed to air attack from Europe or Asia, and (2) that a strong air force at home is the surest method of preventing such attack.

This is not a digression from the main issue, which relates to the value of the battleship, for the situation here depicted could arise just the same if the invading force, before commencing air operations against the United States, had met and defeated a weak

American fleet. This, it is contended, he would have an excellent prospect of doing if there were no American battleships to oppose his own. Without battleship support, cruisers and lesser craft are utterly powerless to resist dreadnaughts. They must either give these heavyweights a wide berth or else be shot to pieces on sight. Submarines have a scarcely better chance against battleships when the latter are screened by destroyers, as was shown time and again during the World War. Hence the profound conviction of so many naval students that a fleet without its due quota of battleships is of small value either as a strategic or a tactical factor.

Having endeavored to prove the efficacy of naval power as an insurance against air invasion, let us now consider a further claim made by air-force champions, namely, that their favorite arm is sufficient in itself to thwart any form of naval aggression, without the aid of sea power. One's thoughts turn instantly to blockade, as being by far the most probable form that naval operations by a great maritime nation at war with the United States would take. There need be no hesitancy in admitting that close blockade has been rendered more difficult by the appearance of aircraft, though, indeed, the idea of close blockade had been given up by naval strategists long before the first efficient airplane ever flew. The development of torpedo warfare had made it too hazardous to be worth while. We have thus to deal only with the distant blockade, which may nevertheless prove just as irksome and, in the end, just as deadly as the older system of short-range blockade used to be.

Now there is no possible means of raising a sea blockade other than by defeating, or at least holding in check, the main naval forces of the blockader. It would be instructive to learn how this could be done by aircraft alone. If the United States were to scrap its battleships it would discard its only shield against the menace of blockade. That operation is effected by maintaining a cruiser patrol across the main shipping routes which converge on a given section of coast. Throughout the World War allied cruisers patrolled a line that stretched from the Shetland Islands to the coast of Norway and thus covered every northern approach to Germany. The cruisers employed on this service were, in fact, armed liners, which any big warship could have blown to matchwood. Yet, apart from submarine raids, they were never molested. The reason for their immunity was simple: behind them

lay the battleships of the Grand Fleet, ready to rush to their support at a moment's notice. Germany, therefore, could not raise the blockade which was strangling her, without first defeating the Grand Fleet, and since her own navy was not strong enough to accomplish this she had perforce to endure the rigors of the blockade as best she might.

If the United States were ever subjected to blockade, the geostrategical conditions would be very different, but the principles would remain the same. Ships approaching her coast would be held up by hostile cruisers, which probably would be careful to keep beyond range of air attack from the land. Blockading cruisers might occasionally fall victims to submarine attack, but when the area of patrol is an extensive one this danger is not very serious, and it can be mitigated by vigilance and skillful seamanship. The Germans, with all their submarines, never succeeded in driving away the British cruisers that maintained the North Sea line of patrol. If America had a fleet of cruisers, destroyers, and submarines, but no battleships, it is difficult to see what she could do against a blockading force. If she sent out her light vessels against the enemy cruisers, these would promptly call up their battleships, the heavy guns of which would soon decide the issue. Aircraft in its present state of development would be impotent to prevent a long-range blockade. To this end counter naval action is essential, but such action could not be made effective without the support of the dominant factor in combat on the high seas—that is, the battleship.

The summer maneuvers off Hawaii are held to have demonstrated the need for a stronger military garrison and a larger air force to protect the islands. Without disputing this conclusion, it is submitted that the maneuvers also revealed in striking fashion the indispensable part which a battle fleet plays in the defense of the Hawaiian group. In these maneuvers a fleet corresponding to that of a certain great power was adjudged to have overcome the defenses of Oahu and thrown ashore a large body of troops. Whether this would be a practicable operation under the logistic and tactical conditions of today is exceedingly doubtful. Certainly, the risks taken by the invading fleet would be appalling, and the odds against success heavy indeed. If, however, the United States were to abolish its battleships, the invasion of Hawaii would be brought well within the bounds of possibility.

It is a platitude of naval strategy that no insular fortress, however strong its defenses, can hold out indefinitely against determined naval attack unless relieved from the sea. Oahu might be crowded with soldiers and amply supplied with aircraft, yet in the absence of a powerful fleet to come to its help it would assuredly fall to a naval siege, provided this was persevered in. The obstacle most likely to deter a would-be invader from crossing the Pacific to attack Hawaii is the American battle fleet. If that obstacle did not exist the enterprise might be launched with a reasonable prospect of success. Communication with the United States would be severed by the enemy's light forces, and with the islands thus cut off from outside help their reduction would be only a question of time.

Apart from the moral effect of complete isolation, their material powers of resistance would steadily diminish without possibility of replacement. Probably the enemy's battleships would not be risked in engagements with the land defenses, but would be held in readiness to deal with any light naval force from the United States that tried to raise the siege. If such a force were sent out it would almost certainly be destroyed. At best, it might contrive to evade the hostile battleships, but evasive tactics have never yet won a campaign. Aircraft reinforcements could only be brought in ships, and ships would have to run the gauntlet of blockade. Always in the background would loom the menace of the enemy battleships, and unless this menace were exorcised every attempt to relieve the beleaguered position would be foredoomed to failure. If recent war experience counts for anything, the battleships could defend themselves against submarine attack. Aircraft, having a strictly limited range, could be avoided by the simple expedient of keeping out of their reach. Nor is it to be supposed that the invaders would neglect to provide themselves with a strong contingent of airplanes, which would be equally available for attack or defense. This problem, there is reason to believe, has been played and replayed on the *Kriegspiel* board at staff colleges in more than one country, always with the same result. The belligerent without battleships ends by throwing in his hand, and the besieged islands are left to their fate. It is a further significant fact that in nearly every war game aiming at the solution of this particular problem the aggressor is assumed to have a battleship fleet and the defender none, the inference being

that if battleships are an asset common to each side the problem of attacking and defending the Hawaiian islands could not, or would not, arise.

Turning from defense to attack, it is here claimed that without a battle fleet the United States would be incapable of conducting aggressive warfare in a remote zone overseas—as it might have to do in order to recover lost territories. Such warfare could not, in any case, be waged without a local base or bases. Battleships, however, would be an indispensable factor in the seizure of advanced bases, even though their power was exerted only indirectly. Once the bases were obtained it would be impossible to utilize them for any operation likely to produce decisive results unless a strong battleship force were available. If an advanced base were used as the starting point for an aerial offensive against the enemy's territory, the aircraft carriers transporting the machines would require battleship support, since otherwise they could be destroyed or driven off by enemy light forces. But with battleships ready to support them if need be, the carriers would be safe from anything less than dreadnaughts; and, if the enemy sent out his ships of this class a fleet action would ensue, in which case the issue of the war might be decided in an hour.

From a careful study of the logistic conditions, it seems obvious that battleships constitute a fundamental element in any scheme of strategy which may be devised for the defense, or the recovery, of American insular territories. Bases are of equal importance, but without battleships the bases would be valueless, even if they could be acquired. British naval authorities are so convinced of the battleship's value that they are building at Singapore a new dreadnaught base which, together with its landward defenses, will probably cost from $75,000,000 to $100,000,000.[2] There is nothing obscure about the chain of reasoning which has led them to embark on this costly undertaking. Singapore is intended to serve generally as a citadel of British power in the Southern Pacific, and particularly as a bulwark of defense to Australasia. It is argued, probably with justice, that no enemy would venture on an invasion of Australia or New Zealand if his line of approach were exposed to an attack in flank by a British battle fleet pivoting on Singapore. In spite of the difficult problems of transport

[2] EDITOR'S NOTE: *Vide* Captain W. S. Anderson's essay this issue, page 437.

which a military invasion of this kind would involve, it would be a feasible and not unduly hazardous operation so long as the defending force had no battleships. The invader's battle fleet would brush aside such opposition as cruisers could put up, and the defense would, therefore, have to rely upon submarines and aircraft; but the former could be kept at a distance by screening flotillas, and the latter would be too limited in range to do anything until the enemy had come within 200 or 300 miles of his objective. The tremendous extent of the Australian coastline militates against the effectiveness of aircraft or submarines for local defense. Hundreds of submarines and thousands of airplanes would be needed to keep the seaboard inviolate. The British have made up their minds that a battle fleet at Singapore represents a much cheaper and more effectual safeguard to Australia.

The battleship is not designed as a commerce raider, but there is every reason to believe that it would be a formidable menace if employed in that way. Cruisers dare not face it. Submarines are too slow and purblind to deal with a ship footloose in the broad ocean; their opportunities for attacking it would depend very largely on luck, a factor upon which the wise strategist never builds. Shore aircraft could do nothing unless the raider came within their limited reach, which he would be careful not to do. Aircraft flying off ships could not cripple him with the light bombs they carry. Torpedo planes might be more dangerous, but the drawback to these machines is that they have to descend close to the surface of the sea before releasing their missiles, and in so doing they offer an excellent target to flat-trajectory barrage fire from rapid-fire guns.

A raiding battleship could "mop up" any and every convoy that was guarded only by cruisers. The only sure method of protecting convoys would be to provide them with battleship escort. The possibility that Germany would send her battle cruisers into the Atlantic was a veritable nightmare to the allies throughout the world war. Elaborate measures were concerted to meet this contingency, including the stationing of a United States battleship squadron off the Irish coast. Assuming that the same danger threatened in a future war, can any air enthusiast honestly maintain that he would be prepared to counter it with aircraft alone? How, for example, would he propose to deal with a hostile battleship raider that was operating on the transatlantic route? The

quarry could not be reached by aircraft flying from the land. It would have to be sought by planes carried on ships, and the military limitations of such machines are notorious. Moreover, the aircraft carriers themselves would be liable to be sunk out of hand by the guns of the raider. In war it is always the heaviest punch that counts. We know the submarine can deliver a fatal blow when opportunity offers and the target is vulnerable. We know the airplane, whether bomber or torpedoist, may—in circumstances so exceptionally favorable as to be almost inconceivable—cripple a dreadnaught. But we know, also, that the most accurate, the least resistible, and the deadliest of all blows that can be struck in naval warfare is a salvo from the heavy guns of a battleship.

To sum up: the case for the battleship may be rested with some confidence on the following points:

1. The big gun is in all respects the most decisive weapon of sea warfare; hence the ship armed with big guns must necessarily remain the capital unit of sea power—provided it can be made reasonably proof against underwater and overhead attack.

2. No battleship now afloat represents the last word in protection. But battleship design is not standardized. There would be no technical difficulty in building a ship that was virtually unsinkable by any form of assault, save gunfire. This would involve some sacrifice of speed; but, even so, the battleship would still be twice as fast as the swiftest submarine traveling submerged, and the low speed of the submarine is not held to nullify its fighting value. Furthermore, by substituting Diesel motors for steam engines, the cruising radius of the battleship could be so greatly increased as to render it independent of bases for weeks on end.

3. The tactical value of submarines and aircraft in oceanic warfare, as distinct from warfare in narrow seas, is largely speculative; that of the battleship is self-evident. It can cruise and fight in weather that would incapacitate submarines and aircraft. It can infallibly defeat every other type of surface vessel. With proper destroyer support it has little to dread from submarines, and with an aircraft carrier in company it need not fear air attack. In any event, the risk of submarines or overhead attack would be cheerfully accepted by a commander of a well-balanced battle fleet in return for the overwhelming weight of offensive power which lay in his hands.

4. The battleship has been well defined as "the *ultima ratio* of naval force, that element of naval force which in the last resort crowns and sustains all the rest." Is that definition applicable either to the submarine or the airplane? All the evidence is against it.

5. The battleship, by reason of its unique hitting and resisting power, affords the sole reliable means of defense against blockade and aerial invasion from oversea.

6. When the torpedo has acquired the range and precision of a 16-inch gun; when submarines have become as swift, as seaworthy, and as habitable as big surface vessels; when the radius and carrying power of aircraft have increased tenfold, and bomb-dropping is as accurate as gun practice: then, but not till then, will the primacy of the battleship be endangered.

First Honorable Mention, 1926

LIMITATION OF NAVAL ARMAMENT

By Captain Walter S. Anderson, U. S. Navy

"Facts are stubborn things"

Introductory

ANOTHER conference for the limitation of armaments is proposed. The protocol for the Pacific Settlement of International Disputes, subscribed to at Geneva by the League of Nations Assembly representatives of forty-seven nations, called for a limitation of armament conference to be held in Geneva in June, 1925. It was not held. The Congress of the United States in a recent appropriation bill, requested the American President to call another conference, to take up the work unfinished by the Washington Conference. It has not yet been held, or convoked. Very recently, the League of Nations has invited all nations, including the United States, and even Soviet Russia, to send representatives to confer at Geneva to arrange the preliminaries of a limitation of armament conference which it is hoped by the League will be comprehensive in its treatment of that great subject.

The tremendous possibilities for good for all humanity from limitation of armaments, and elimination of wasteful and animosity provoking competitions in armaments, excite the sympathy and arrest the attention of all but professional fire eaters, of which there are fortunately fewer than in the past.

The proposed conference will be influenced, perhaps guided, by the Washington Conference, which resulted in the Washington Treaty for the Limitation of Naval Armaments, signed February 6, 1922.

Due probably to lack of adequate, timely, and authoritative American publicity in connection with the Washington Conference, there was little intelligent public discussion in connection with it until the Treaty was an accomplished fact.

The Washington Treaty was signed and ratified by the United States of America, the British Empire, France, Italy, and Japan. Its salient provisions fixed the capital warship and aircraft carrier tonnage of those powers as shown in the following table.

The treaty definition of a capital warship may well be quoted: "A capital ship, in the case of ships hereafter built, is defined as a vessel of war, not an aircraft carrier, whose displacement exceeds 10,000 tons . . . . standard displacement, or which carries a gun with a caliber exceeding eight inches. . . . ."

Power	Capital Ship Tonnage	Aircraft Carrier Tonnage
United States	525,000	135,000
British Empire	525,000	135,000
Japan	315,000	81,000
France	175,000	60,000
Italy	175,000	60,000

From the ratio of such tonnage allowed the largest three navies, 5-5-3, the Washington Treaty is frequently referred to as the 5-5-3 Treaty. This designation has the virtue of brevity, and yet distinguishes the Limitation of Naval Armament Treaty from the various other treaties made at the Washington Conference.

The prospect of another conference revives interest in the 5-5-3 treaty. Is that treaty all that could be desired? Will it serve as a proper guide for the next conference?

Critical examination of the 5-5-3 Treaty by no means implies lack of sympathy with the principle of limitation of armaments upon an equitable ratio. One can sympathize with the wished for consummation of the Washington Conference without believing that the 5-5-3 Treaty is all good.

Nor does such discussion question the good faith of any nation or individual. The pact was voluntarily entered into. Each of the nations invited to the conference naturally and properly drove the best bargain that it could.

Neither does such discussion indicate a bellicose tendency. Navies are for a certain purpose—national security. Intelligent consideration of the size of a navy demanded by national security requires consideration of the navy's *relative* size, and of its *relative availability* under various conditions.

If the treaty is all right, it can stand close inspection. But if it contains mistakes or unfair provisions, it makes eventually for

international discord, not for peace and security. Its shortcomings should be recognized if they are not to be duplicated and perpetuated. The fullest discussion of the 5-5-3 Treaty seems most desirable before the United States shall subscribe to another such agreement.

Furthermore, discussion of the Washington Treaty is desirable in connection with the question of eventually modifying that treaty itself. According to the treaty's terms it can be modified or terminated under certain conditions. One of those is, of course, participation in war. Also if there has been a material change of circumstances, a power may request the others to meet in conference for reconsideration and amendment. The treaty also says that "in view of possible technical and scientific developments," the United States, after consultation with the other powers, shall arrange for a conference "as soon as possible after the expiration of eight years from the coming into force of the present treaty, to consider what changes, if any, may be necessary, to meet such developments." As the treaty was finally ratified and came into force August 17, 1923, the time for reconsidering its provisions in conference is less than six years away.

However, it might be contended that there have been no change of circumstances or scientific or technical developments justifying modification. No one can foresee conditions that far ahead, which is the very reason for these provisions of the treaty, but such a contention might conceivably have merit. In that case the United States could not suggest anything that savored of repudiation. But the treaty also provides that it shall remain in force until December 31, 1936, which does put a possible period to it, and does then give an opportunity to demand amendment of it as of right, and not as a privilege. However, the treaty will not end then, unless one of the contracting powers shall have given at least two years prior notice of its intention to terminate the treaty. Analogous timely notice would plainly be required in case it were the intention to demand amendment, for the alternative of the failure of mutual agreement on amendment, would in the last resort be termination.

Therefore, if any modifications are to be made in that treaty, they must be considered in ample time to be decided upon, and presented in proper form to the interested nations before the end of the calendar year 1934. That is but eight years away.

The Ratio

Upon what consideration was based the fundamental ratio of 5-5-3? Was it a fair one?

It was stated that it represented approximately the ratio of heavy warship tonnage possessed by the respective powers at the time of the conference. It is generally conceded that armament expenditures are insurance premiums upon a nation's possessions. The national wealth of the United States bears to that of Japan more nearly the ratio of 20 to 1 than it does of 5 to 3. It seems questionable to ignore such considerations as relative national wealth.

Certain types of ships, such as cruisers and transports, can be quickly furnished from the merchant marine. If two countries are allowed equal tonnages of regular warships, as is the case with Great Britain and the United States, it is then plain that the one of these two countries which has the largest merchant marine has the greatest navy for practical purposes. Therefore the relative merchant marines possessed by the respective countries are proper considerations in arriving at the ratio of warship tonnages to be allowed them, particularly of types of vessels which can be supplemented from the merchant marine. Specifically, if the United States and Great Britain are actually to have the parity supposed to be given them by the treaty, Great Britain with the world's greatest merchant marine, should not expect to be allowed as great a regular cruiser tonnage as the United States.

Disproportionate Sacrifice

The treaty required the United States to sacrifice eleven partially completed heavy warships, battleships, or battle cruisers. Of this number, one, the *Washington,* was three-fourths completed. Three others were more than a third completed. Two others were more than a fourth completed, and one other more than a fifth completed. The other four were actually started, construction being about one tenth advanced. Three hundred and thirty million dollars had been spent upon these eleven ships, now scrapped, and many more millions had to be spent to cancel contracts and actually scrap them.

How many heavy ships of the first line under construction did Great Britain scrap? Only four, in such an early stage as to be referred to in the treaty as: ". . . . four building or projected."

Mr. Hughes, the American Secretary of State, in his opening speech at the Washington Conference, when specifying action it was proposed be taken, referred to these ships in the following words: ". . . . that Great Britain (1) Shall stop further construction of the four new *Hoods,* the new capital ships not laid down, but upon which money has been spent. . . . ." Note the words, *"not laid down."*

A Costa Rican, a midshipman by special permission of Congress, was once asked by a thoughtless Annapolis classmate of what the Costa Rican navy consisted. Drawing himself up proudly, the Central American youth replied: "Of three gunboats—pause—*which are to be built.*"

That was the kind of new battleships that Great Britain sacrificed. Why was it necessary in arriving at limitation of international naval armaments for such a disproportionate sacrifice to be made by the United States?

Fair Limitation Possible

Why should not the ratio have been observed by the United States completing all its ships that were well advanced in construction, with the proviso that it would then cease building for a specified time, and that in the meantime the other nations might complete construction in progress, or build, to give them their proportionate tonnage? If necessary to keep within a maximum allowed tonnage, the United States could have scrapped more old ships. This would have avoided the waste of destroying new ships, while retaining the old ones. This waste was a great initial one, and also a continuing one, as it costs more to maintain old ships than new ones. This proposition would not have been unfair to the other nations. They would have had a chance to build the latest models. Like automobiles, battleships improve rapidly in design from year to year. Also they increase greatly in cost of upkeep with increase of age. The old ships retained by the United States even now cry aloud for extensive betterments, in addition to repairs of a more routine nature.

Such a proposed plan would have been fairer to the shipbuilding interests, financial, and human. They would have had more time in which to readjust themselves, instead of suddenly finding themselves out of a job. The disruption of the shipbuilding industry is a national mistake both from the economic standpoint, and that

of defense. The British Empire did not neglect this consideration, and by the treaty was allowed at once to build two great heavy ships to replace older tonnage.

These are the *Nelson* and *Rodney,* with their nine 16-inch guns each, and "all modern improvements," superior to all other fighting ships in the world.

Was a Precedent Established?

However, that particular milk has been spilled. It will be interesting to see if by this great act of national renunciation, generous beyond example, the United States really did establish a precedent.

The number of reasonably modern light cruisers possessed by Great Britain, the United States, and Japan, built and building, is respectively 51-12-25. That expresses the specific numbers of cruisers, and at the same time gives the ratio. It is obviously quite different from 5-5-3. The United States is conspicuously short in number of light cruisers. Now if the United States did establish a principle by sacrificing so many heavy ships, it was that nation with most vessels of a type should reduce to the prescribed ratio by scrapping vessels. Even upon the basis of a 5-5-3 ratio this would require Great Britain to scrap thirty-nine light cruisers, and Japan to scrap seventeen. Will they do it? By their actions the world will learn their frank opinion of the sacrifice the United States made. For the first time in history a nation voluntarily renounced naval supremacy.

No Battle Cruisers for the United States

There is another serious result of the treaty, which is irrevocable for at least a decade. Much can happen in a decade, as the last one shows.

Great changes in the political world come to mind; dynasties have passed, and the map of Europe has been radically altered. But there have been other changes, just as great, and just as pregnant for the future, if not quite so apparent on the surface. In the last ten years the trade of the United States with Asia has quadrupled to its present figure of more than $1,500,000,000 a year. It could shrink more rapidly than that.

Of the sixteen fine heavy ships building for the United States at the time of the Washington Conference, six were battle cruisers.

The United States did not possess any vessels of that type, and, of course, possesses none now, due to the treaty. The United States' building program was an attempt to correct a serious deficiency in its Navy—the total lack of battle cruisers. Great Britain and Japan each have four battle cruisers. These great, heavily armored ships, carrying guns of battleship caliber, can also make high speed. They have speeds of about 28 knots an hour. No United States battleship can exceed a small fraction more than 21 knots. What is the United States to do if its commerce be attacked by battle cruisers? The United States has nothing that could overtake a battle cruiser that could not be promptly blown out of the water by the battle cruiser.

The only answer to battle cruisers is battle cruisers. They are the potential heavy commerce destroyers, raiders, heavy scouts, swift escorts, and fast wing of the battle fleet to which the United States has no counter. It was with battle cruisers that the Germans repeatedly raided the east coast of Britain. Only their fear of the British "cat" squadron of battle cruisers limited their raids. The world saw what happened to the commerce of the Mistress of the Seas when the marauding *Emden,* speedy for her time, but only a light cruiser, was at large. It also saw that it took battle cruisers to bring von Spee to bay at the Falklands after he had sunk the British cruisers under Cradock at Coronel. The lack of battle cruisers may yet spell national disaster for the United States.

Gun Elevations

The responsible authorities state that the older retained battleships of the United States require extensive betterments. They need to be re-boilered, to be converted to oil burners, and to have more horizontal deck armor as protection against aerial bombing. They also need "blisters," or bulges of the hull at the turn of the bilge, or similar provision to protect them from underwater attack, in the same way the British ships have been protected.

Most important of all, thirteen of the United States battleships need to have greater turret gun elevations. At present they are outranged by the guns of the British battleships, because the latter have the greater angles of elevation. The British battleships have in general greater speed than those of the United States. It is plain that a navy with superior speed and greater gun range is a superior navy.

The treaty purports to give parity between the United States and Great Britain. One little clause of the Washington Treaty reads thus:

"No alteration in side armor, in caliber, number or general type of mounting of main armament shall be permitted except: . . . ."

The American Secretary of the Navy and American President say that the United States has a right to increase its turret gun elevations. The Japanese were so sure that the right was not taken away by the treaty that they actually have increased theirs.

However, Great Britain officially objects to the United States increasing the elevation of its turret guns, and declares that such an increase would be a contravention of the treaty. Whether this contention is correct or not, the right certainly existed before the treaty was acceded to, and now it is questioned.

Meanwhile certain of these ships are undergoing extensive alterations, but the turret guns *are not* being given greater elevations. That is, the Treaty is now preventing necessary work on United States battleships needed to give parity with Great Britain.

Article XIX

Mr. Hughes, in presenting to the Washington Conference the original proposal of the United States for a limitation of naval armament, said, among other things:

It is also clear that no one of the naval powers should be expected to make these sacrifices alone. The only hope of limitation of naval armament is by agreement among the nations concerned, and this agreement should be entirely fair and reasonable in the extent of the sacrifices required of each of the powers.

It is significant that the original proposal of the United States had nothing to say about the *status quo* of fortifications and naval bases. It proposed the 5-5-3 ratio of capital ship tonnage, and various collateral matters that bore upon that main proposition, and made it specific.

The report of the American delegation contained the following paragraph:

Before assenting to this ratio the Japanese government desired assurances with regard to the increase of fortifications and naval bases in the Pacific Ocean. It was insisted that while the capital ship ratio proposed by the American government might be acceptable under existing conditions, it

could not be regarded as acceptable by the Japanese government if the government of the United States should fortify or establish additional naval bases in the Pacific Ocean.

We see then, that the American proposal, which was deemed by the American delegates to be fair to all concerned, proposed a 5-5-3 capital warship tonnage ratio, as between the British Empire, the United States, and Japan, based upon existing conditions, which included *full liberty of action* for the three countries concerned with respect to fortifications and naval bases anywhere in the world, including, of course, the Far Eastern theater. It does not seem to have been noted particularly by the American delegates that the original 5-5-3 ratio, if an equitable one when there was liberty of action as to fortifications and naval bases, at once lost that condition of equity when certain other conditions were injected that were foreign to the original basis of consideration.

The American delegation reported that "after prolonged negotiations, the three powers" agreed upon Article XIX of the Treaty. Article XIX follows:

The United States, the British Empire, and Japan agree that the *status quo* at the time of the signing of the present Treaty, with regard to fortifications and naval bases, shall be maintained in their respective territories and possessions specified hereunder:

(1) The insular possessions which the United States now holds or may hereafter acquire in the Pacific Ocean, except (a) those adjacent to the coast of the United States, Alaska, and the Panama Canal, not including the Aleutian Islands, and (b) the Hawaiian Islands;

(2) Hongkong, and the insular possessions which the British Empire now holds or may hereafter acquire in the Pacific Ocean, east of the meridian of 110-degrees east longitude, except (a) those adjacent to the coast of Canada, (b) the Commonwealth of Australia and its territories, and (c) New Zealand;

(3) The following insular territories and possessions of Japan in the Pacific Ocean, to wit: the Kurile Islands, the Bonin Islands, Amami-Oshima, the Loochoo Islands, Formosa, and the Pescadores, and any insular territories or possessions in the Pacific Ocean which Japan may hereafter acquire.

The maintenance of the *status quo* under the foregoing provisions implies that no new fortifications or naval bases shall be established in the territories and possessions specified; that no measures shall be taken to increase the existing naval facilities for the repair and maintenance of naval forces, and that no increase shall be made in the coast defenses of the territories and possessions above specified. The restriction, however,

does not preclude such repair and replacement of worn out weapons and equipment as is customary in naval and military establishments in time of peace.

What Article XIX Means

We have seen what Article XIX says. Now just what does it mean? It means that Japan, the British Empire, and France are free to fortify and develop naval bases in the Far East, but the United States as a result of the 5-5-3 Treaty *no longer has that right*. The United States owns Guam and the Philippines, but it cannot add one gun to their fortifications, and it cannot construct in them a dock large enough to take its largest ships, although it has no such dock there now. The nearest location in which the United States still has freedom of action in this regard is in the Hawaiian Islands. But they are almost five thousand miles from Manila.

Admiral Mahan, that universally recognized master upon the subject of sea power and naval strategy, wrote as follows upon the subject of America's interest in sea power:

> Let us start from the fundamental truth, warranted by history, that the control of the seas, and especially along the great lines drawn by national interest or by national commerce, is the chief among the merely material elements in the power and prosperity of nations. It is so because the sea is the world's great medium of circulation. From this necessarily follows the principle that, as subsidiary to such control, it is imperative to take possession when it can be done righteously, of such maritime positions as contribute to secure command. . . . .
>
> The military or stragetic value of a naval position depends upon its situation, upon its strength, and upon its resources. Of the three, the first is of most consequence, because it results from the nature of things; whereas the two latter, when deficient, can be supplied artificially, in whole or in part. Fortifications remedy the weaknesses of a position, foresight accumulates beforehand the resources which nature does not yield on the spot; but it is not within the power of man to change the geographical situation of a point which lies outside the limit of strategic effect.

To understand just what Article XIX means it is necessary to look at the map of the Pacific, particularly the western part.

In the past the United States considered it necessary to keep some of its biggest ships in the waters of the Far East. With the present unsettled conditions in China, or for other reasons, the United States may again desire to keep some of its battleships in those waters. For their supply, repair, and docking, it would be necessary to have at least one adequate base. But the United

States has no such base in the Far East. Her battleships would have to go the five thousand miles to the Hawaiian Islands for docking, or even to the United States, two thousand miles further. This is bad, but the United States can submit to it if the other powers can. But they labor under no such handicap, as a little study of Article XIX quickly shows.

Japan retains full liberty of action on her home islands, to develop and fortify naval bases as she sees fit, if she desires more than the excellent ones she already has. Her position dominates the Japan Sea, the Yellow Sea, and the China Sea, and assures those communications to the mainland of Asia which Japan considers vital to her interest. That it should be so no friendly nation can reasonably protest, and the President was never more the spokesman of the United States, than when, in opening the Conference, he said: "Content with what we have, we seek nothing which is another's."

For three thousand miles, from the tip of Kamchatka, to Formosa, Japanese islands are outposts off the coast of Asia. Just south of Formosa lies the South China Sea. It is bounded on the east by the Philippine Islands. This would seem to give the United States a legitimate interest in this region. But in all the Philippines must be maintained the *status quo* of naval bases and fortifications. This is equally true in Hong Kong and Borneo, British possessions on the north and south, respectively. But notice the principal meridian that runs down the western part of the South China Sea, the 110th meridian of east longitude. To the west of that the British Empire retains full liberty of action. And to the west of that, just a little, lies Singapore, at the southern end of the South China Sea.[1] Here the British propose to develop a great naval base. It is less than fourteen hundred miles from Manila, where the United States may *not* develop a base. Its distance from Manila is just about the same as that of Sasebo, a Japanese home island existing naval base, which, of course, may be developed as Japan sees fit.

Article XIX does not mention France. On the coast of Cochin China, just west of the meridian before mentioned, France possesses one of the finest harbors in the world. Here is Camranh Bay, eight hundred miles to the west of Manila. It was here that Rozhdestvensky based the Russian fleet on that long cruise that

[1] EDITOR'S NOTE: *Vide* Hector C. Bywater's essay page 423 this issue.

ended so tragically at Tsushima. This magnificent bay "could hold the navies of the world."

Britain, France, and Japan may fortify and develop new or old naval bases in positions to support battleships in Far Eastern waters, but the United States may not. That is what Article XIX provides, the article that was the result of "prolonged negotiations," which treats of matters entirely absent from the original American proposal.

The proponent of that Article was Japan, which is comprehensible, but that it should have been accepted by the United States is incomprehensible.

A recent writer has aptly and with great reserve stated:

> By renouncing their right, under Article XIX of the Washington Treaty, to develop major naval bases in the Western Pacific, the American people gave hostages to fortune which most strategists believe to be irredeemable.

Future Trade

Treaties bind for the future. Posterity has rights. Consideration of the future implies also a survey of the past and the present.

The population of the United States in the last hundred years has increased 100,000,000. For the last fifty years the annual rate of increase has been over 1,000,000 a year. As the population increases, the production of the country increases. Increasing foreign markets must be found for its exports, if the balance of trade is not to become fatally adverse, and if the high standards of living are to be maintained. A century hence with a population probably more than twice the present one, the United States will require a proportionately greater foreign market. It must have its share in developing new markets, and in enjoying their commerce when developed.

Consul General Lay, in his recent book on the Foreign Service of the United States sums it up in one paragraph: "We are an industrial nation. Already production has so far surpassed our domestic consumptive capacity as to render us largely dependent upon exports for the essential margin of prosperity. What is to be our industrial future if not in export trade?"

Asiatic Market

The market of the future must largely be found in Asia. Of all the grand divisions of the earth, it is the least developed as a market, and is the most rapidly developing. In the last fifty years

the export trade of the United States with Asia has increased from 2.2 per cent of the total United States export trade to 12.3 per cent. No other geographical grand division can show an equal increase. Europe's proportion of the United States export trade is decreasing. Also there has been a correspondingly great increase in the import trade of the United States with Asia. Fifty years ago it was but 8 per cent of the total import trade, and now it is 26.9 per cent. In both cases, the increases have been sustained and gradual. Of the total annual foreign commerce of the United States amounting to $7,900,000,000, $1,531,000,000 worth is with Asia. It has quadrupled in the last ten years.

Not only is the commerce of the United States with Asia very great and rapidly increasing, but it bids fair, if properly protected and encouraged, to continue. That part of the world constitutes almost a virgin field, commercially. The total of imports and exports per capita per year in China is but $3.09. In no other country is it so low, except Russia since the war, or the Congo. Highly developed countries, commercially, such as the United Kingdom, which has a corresponding figure of $180.56 or sixty times as much, cannot possibly offer such attractive future possibilities for trade.

Asia is the home of more than half the population of the earth. That great industrial revolution which in the last century has so greatly modified the productivity, the demands, and the consequent commerce of the so-called Western powers, has hardly yet made a ripple in the stream of Asiatic life. But all signs point to a great awakening there. The great potential market of the world is Asia.

Commerce Requires Naval Bases

What has Article XIX to do with all this? Just this, that a country's foreign trade must have the backing of its navy *on the spot.* A merchant ship arbitrarily detained by the order of some power in the Far East needs help *in the Far East.* The diplomat arguing against unfair trade restrictions, such as discriminatory tariffs, port dues, freight charges, and the like, needs the support of visible evidence of his country's power. Particularly is the mind of the Orient impressed by what it can see. Consul General Lay pertinently remarks:

> According to traditional conceptions, the authority and force of diplomacy are derived from the power of a nation to inflict injury upon another.

War, or the use of force, is as much a part of diplomatic action as is the dispatching of courteous notes or an ultimatum. . . . . Armaments are an effect; not a cause. Armies and navies move under sealed orders written by diplomacy; they cease firing when diplomacy gives the command. . . . .

For a navy to be on the spot, it must have proper bases for refitting, refuelling, and supply, conveniently located. Like automobiles, the ships of the navy require their service stations and garages conveniently located.

It is no coincidence that Great Britain has a great foreign trade, a great navy, and naval bases so well scattered about the world that the sun "never sets" on them. The recent round-the-world trip of the British squadron was punctuated by stops at British naval bases at convenient intervals. Consider Great Britain's bases enroute to Asia: Gibraltar, Malta, Suez, Aden, Colombo, Singapore, and Hong Kong.

The British project to develop at Singapore a great naval base, upon which millions will be spent, has been revived since the World War. This is the result of careful consideration by British Empire strategists and statesmen. The plain reason is that that region has become the world's strategical focus. It is in the great fallow commercial field of the world, and at the crossing of the ways of the world's commerce.

Great Britain, France, and Japan may all have adequate naval bases in the Far East, and may further develop and fortify them. But the United States may not. The United States possessed that fundamental right before it acceded to the Washington Treaty, but that Treaty took away the right.

Defense Requirements

If the United States is to continue to enjoy its share of the developing commerce of Asia, it must be able to defend that commerce. It must be able to maintain in far eastern waters sufficient naval strength to support its diplomats and consuls, to prevent any encroachments upon its legitimate trade, any unfair discriminations, or any attack upon its ships of commerce, or their crews. This naval force is also required as a safeguard for United States territory in those parts, that is, the Philippines and Guam, and also to protect the missionaries, and other Americans in that part of the world.

Therefore just plain defense, and not aggression, requires that the United States be able to maintain far away in Asiatic waters a naval force great enough to act as a counter against the biggest fleet that may be out there on the spot.

The Naval Handicap

That there is no dock in the Philippines or Guam large enough to take the United States battleships or aircraft carriers is a tremendous handicap. The one such dock in Hawaii is too far away. And further still is the one on the west coast of the United States, and the one at the Canal Zone.

Ships have to be docked every six months to clean their underwater bottoms and overhaul their outboard fittings, if they are to maintain their speed and efficiency. Other overhaul work requires their presence in a navy yard up to an average total of a month and a half a year. It is, of course, not possible to be dogmatic about this, but this is a fair statement. Sometimes they need longer, seldom less.

There being no adequate American dock nearer the Far East than Hawaii, battleships would have to go at least the five thousand miles from Manila to Hawaii for their semi-annual docking. That requires a month and a half of steaming at 10 knots (economical speed) just for the round trip. Two round trips a year and a month and a half of work in the navy yard add to four and a half months per year that each battleship would have to be off station if it were docked in Hawaii.

But any practical student of these questions knows that this assumption is too optimistic. He knows also that there would be occasional delays in completion of work, due to developing troubles not seen until overhaul started. He knows that each ship would average off station at least five months of the twelve, and more, probably six.

That is, for the United States, without an adequate far eastern naval base, to keep one heavy ship on station there, the services of two ships would be fully engaged.

And that estimate does not take into consideration that the long line of communications, seven thousand miles from San Francisco to Manila, would in war time require protection and demand its quota of ships, including heavy ones.

Poor Economy

For each useful battleship at the spot needed, there would then be one unavailable. At least half of that time would be spent in going to or returning from a distant dock. With a dock at hand there would obviously be no such loss of time. It was to take the place of ships lost to the British Fleet due to absences in nearby home docks, that even the great British Navy required the aid of the American battleship squadron which served with the British at Scapa Flow. They could not risk the loss of fleet preponderance that would have obtained had the Germans sallied forth with their full fleet when a considerable number of British battleships were undergoing their regular and indispensable overhaul.

And think of the fuel that would be saved in avoiding the thousands of miles of futile steaming!

When it may be desired to keep the United States battle fleet in the Far East, an adequate base there, costing about the price of one battleship, would make five more battleships available for instant service. And even the ones undergoing overhaul would be at hand. Admiral Lord Charles Beresford said that "Battleships are cheaper than battles." He might have added that sometimes bases are cheaper than battleships.

Results of Article XIX

Article XIX, by denying the United States proper naval bases in the Far East, destroyed the 5-5-3 ratio originally proposed as effectually as if a pen had been drawn through the ratio and the figures changed.

At the same time, Article XIX took from the United States its ability to support the principle of the Open Door. This principle of equal trade opportunities for all nations in the Far East has been a traditional policy of the United States. It was even reiterated in the Nine Power Treaty, also agreed to at the same Washington Conference that resulted in the 5-5-3 Treaty.

Whatever existing agreements may purport to allow, when the United States lost the power to support the principle of the Open Door with its Navy, for practical purposes it lost the benefits of that principle. That door requires not only the diplomat's touch on the handle, but the Navy's foot in the opening.

Objections to Base Answered

In the Jones Bill, the United States promised the Filipinos their independence upon the fulfillment by them of certain conditions. It may be objected, therefore, that the United States should not establish a considerable naval base in territory ultimately to be given up. The same might have been said about Cuba, which has been given its independence. However, with the consent of the Cubans, the United States retained the Guantanamo naval base and has the right to retain it forever.

In *Asia* for November, 1921, Mr. Manuel Quezon, President of the Philippine Senate, writing on the subject, "America's Pledge to the Philippines," makes it plain that the element for which he speaks desires the independence promised in the Jones Bill. However, among other significant things, he says:

> On the other hand, an independent Philippine government would be grateful to America; it would continue its existing economic relationship with the United States to the mutual benefit of both parties concerned; it would grant to the United States the coaling stations required for maintaining a strategic position in the Pacific, and so forth.

Conclusion

The 5-5-3 Treaty is uneconomical. It requires maintaining old ships instead of newer ones. It requires more ships to do a task that fewer could do if provided with proper bases.

The 5-5-3 Treaty is unfair. It allows other nations to have and yet develop naval bases in locations that control the Far East and denies that right to the United States. By this it destroys the 5-5-3 ratio, and permits the Open Door to be closed.

The 5-5-3 Treaty has sacrificed the United States' defense of its territories, of its trade, and of its interests in the Far East.

The 5-5-3 Treaty is not only contrary to the present security and interest of the United States, but the interests of posterity have been disregarded. American posterity's birthright to a fair share of the future trade with Asia has been yielded to others.

Second Honorable Mention, 1926

SOME ASPECTS OF OUR AIR POLICY

By Rear Admiral W. V. Pratt, U. S. Navy
President U. S. Naval War College

"Truth Will Prevail"

1. *Introduction*

RECENTLY the country has been stirred by the air controversy carried on in the press. In general, it may be said this controversy centers upon the two varying viewpoints:

1. Shall we adhere to our present air policy modified to meet new conditions as they occur, or

2. Shall we, without further thought, embark on a scheme of national defense which involves the creation of an independent air force. The proponents of the separate air force likewise advance the schemes:

a) a force similar to the Royal Air Force of England, in which air units are farmed out to the military and naval forces as needed and,

b) an air force military in character, independent and separate from the air forces now forming a branch of the Army and the Navy. Congress has made an investigation into the subject and lately a board was appointed which has submitted its report. This report was published in full. In the main it approved of the present air policy created and put into effect by the Navy.

The purpose of this paper is to give you a brief outline of the present naval policy relating to aviation, to point out to you wherein this policy is sound, to show you why the pleas of those who advocate for America a united and independent air force are fallacious, and why the doctrines which they advocate are unsuited to the character of the American people and the form of government under which they live.

2. *A Brief Outline of the Status of the Laws of War up to 1914*

In order to put you in touch with the traditions and the motives actuating our naval and military men when forced to engage in war, I take the liberty of quoting from Oppenheim on *International Law*, page 59:

> It must be emphasized that war nowadays is a contention of states *through their armed forces*. Those private subjects of the belligerents who do not directly or indirectly belong to the armed forces do not take part in the armed contention; they do not attack and defend, and no attack is therefore made upon them. This fact is the result of an evolution of practices which were totally different in former times. During antiquity, and the greater part of the Middle Ages, war was a contention between the whole of the populations of the belligerent states. In time of war every subject of one belligerent, whether an armed and fighting individual or not, whether man or woman, adult or infant, could be killed and enslaved by the other belligerent at will. But gradually a milder and more discriminative practice grew up, and nowadays the life and liberty of such private subjects of belligerents as do not directly or indirectly belong to their armed forces are safe, as is also, with certain exceptions, their private property.

It should be borne in mind that the principles enunciated in the above quotation stood in 1914 as fundamental. It was the policy which actuated our naval men when they were forced to undertake operations due to a condition of war existing between our United States and another nation.

War may not always be avoided. War after all, is only a means to an end. It is a way of settling an international difference which diplomacy has failed to adjust and which is not susceptible of treatment by other methods of pacific settlement. War is not always an illegal act, because as states are sovereign, and as consequently no central authority can exist above them able to enforce compliance with its demands, war cannot be avoided always. International law recognizes this fact but at the same time provides regulations with which the belligerents have to comply.

It was only after states recognized the fact that it was a better way to wage war through their armed forces, that it became possible to codify the methods and means to be used in the conduct of war in a set of rules which became known as international law. This is not all of international law, for rules of conduct exist between states in times of peace, but in a limited sense international law has come to have a more restricted meaning as applying to the rules of war. As you know, in war the most violent of human

passions break out, the differences between states are more acute, and the methods taken to insure compliance with state desires are more drastic. Therefore, this is a reason why during times of peace, when men's minds are not inflamed, they do endeavor to make rules which will ameliorate the conditions imposed by war, in order that war shall be less dreadful than it had been previously.

As an instance, in July, 1899, the Hague Conference adopted a declaration, signed on July 29, 1899, by twenty-five powers, stipulating for a term of five years the prohibition in a war between two or more of the signatory powers against the launching of projectiles or explosives from balloons or by any other methods of a similar nature. This declaration was signed by Austria-Hungary, Germany, France, and the United States, but not by Great Britain. As it was not renewed, it lapsed in July, 1904.

Up to the last war, American naval men had regarded the submarine as merely one of the striking arms of the fleet. Its objectives and its methods of waging war were as strictly to be regulated by the rules of international law as were the methods of attack used by any other arm of the fleet. It could operate according to its capacity in any known legitimate way, but it was not permitted to introduce new objectives or new methods of attack previously outlawed in order to impose the will of its government upon that of any other sovereign state. In other words, we deemed that the art of war among civilized nations had progressed to such a state that certain codes of conduct would be recognized and that they would not be violated. This was the point of view supposed to be held throughout the civilized world.

3. *The New War*

The World War of 1914-1918 has been looked upon by many, and especially by those who desire to urge unlimited warfare, as a new type of war and the war of the future. In plain language, they predict that future wars will be of so far reaching a character, in which all the inhabitants of a state, directly or indirectly, will be involved, that therefore and for that reason, any methods may be used to compel one state to acknowledge the will of another, even to the bombing of unprotected towns and the destruction of the unarmed peoples thereof. While it is true that the character of modern wars has changed, owing to the advancements in science, and to the fact that wars may be waged by great in-

dustrial and commercial nations, and while undoubtedly it is necessary to provide for national security, it does not follow that illegal methods adopted in the past should be perpetuated into the future on the plea of expediency. More truly may it be said, such advocacy is a plea for a return to the ruthlessness and to the barbarism of older times. Once in the midst of the late war, with minds and passions inflamed, there was not the time nor the inclination to give thought how best to meet modern conditions. Rather, the idea was uppermost, how accomplish one's will regardless of the rights in the matter or of any ethical and humanitarian considerations. It is desired to invite attention now to the fact that during those times of abnormal conditions the conception of an independent air force came into being and was actually put into effect.

4. *The Principal Outstanding Results in a Military Sense of the World War*

The first, and probably the most important point to consider is the fact that as a result of the last war there originated a school of thought which believed it was right, either to scrap all of the old existing rules, built up through years of tradition and custom, or else to modify existing international law as to render unlimited warfare practicable. The advocates of unlimited war nearly all have been found in the camp of those who advocate a united and independent air force for, as was proven in the last war, unless the objective be behind the lines, and unless the efforts be directed at the civil population, and at the industries of the state, the war effort of the independent air force is not the principal military or naval effort. Reasoning men who decry the lawless practices of the last war are loath to admit in the face of the advocacy of unlimited warfare that "properly trained and directed, air power is capable of transforming the whole face of war almost beyond recognition and that it can turn the old, crude, hideous, bloodletting business into an almost bloodless surgery of forcible international adjustment, to the immeasurable advantage of mankind." Spaight, page 2.

The matter of the submarine is altogether too fresh in our minds. You have seen how it was regarded before 1914 by the naval men who had to use it. The statement is ventured here that the lawless use of the submarine during the last war was due

less to the advice of naval men, who advocate following the dictates of international law, than to the counsels of those who advocate unlimited warfare You all know how the submarine became detested throughout the civilized world and how because of its misuse a most valuable arm of the fleet has received a very black name. In this connection a quotation taken from *Air Power and War Rights* by J. M. Spaight, published in 1924, is apropos. The quotation which is made and which applies to the independent air service could in 1914 have been applied with equal force to the submarine by the simple process of substituting the word "submarine" for "air force."

The direct action of air power.—Now, for the first time in history it has become possible to dispense with the preliminary stages. Air power can strike straight at the heart of the enemy state. It can ignore armies and fleets. Like the plot of an Ibsen drama it can plunge *in medias res* and begin where the old warfare all but left off. It will not waste time on the slaughter of those who are only the armed instruments of the sovereign people of the enemy nation. True, there will be air combats; the enemy's flying forces will have to be fought, and the bases of those forces will be a prime objective. But air forces will not, most assuredly, seek only such objectives; and, however intense the fighting in the air, the slaughter will be as nothing compared with that of the older war. Air power will not be prevented by opposing air power from penetrating an enemy's defense. A cordon of impenetrable aircraft is an utter impossibility. It will set itself to the task—a political rather than a strictly military one—of bringing pressure to bear upon the principals, whose agents have hitherto had to be destroyed as an essential preliminary, to the further processes now immediately practicable. It will cut out certain stages in the older method of approach to the real end of war—the imposing of one nation's will upon another. In its power of "direct action," it will see a means, and an effective one, of attaining that end without resorting to the slow, costly, ineffective, murderous procedure of conducting a campaign of bringing a hostile fleet to action.

Having this power to overlap the enemy's defenses, will aircraft consent to behave as if they had not? Will they be so obliging as to observe a convention that the correct and traditional objects of attack are the protecting *corps d'armée*, the sure shield of the fleet, of the opposing state, and that only when these are destroyed may the fruits of victory be gathered? Will they not rather eliminate the processes of the historical mode of warfare and set themselves from the outset to the work of exerting that pressure to which battles are merely the preliminary?

Again:

The rôle of the air arm.—It is not suggested that no need or occasion will arise for aircraft to operate against armies or fleets. Assuredly, at any

rate for some time to come, they will have to do so. But steadily and surely, of the three categories of objectives of air power—the armies or fleets of the enemy, the military objectives outside the operational zones of those armies and fleets, and the general mass of property in the enemy state—the last will tend more and more to replace the two former categories as the focus of attention from the air. Armies which dig themselves into lines of trenches, supported by successive lines so deep and strong as to make a real breaking-through an affair of appalling magnitude, fleets which shelter themselves behind harbor defenses, and minefields, and venture whole-heartedly upon a major engagement only by a sort of mis-chance, will be left to wage their own war of attrition. They will have, no doubt, the assistance of the necessary ancillary aircraft, but one must contemplate in future wars the existence of "marginal" air forces which can be employed strategically. It is hard to believe that these will waste their time around the fields of operations or the well guarded coastal points, or that, in going further afield, they will confine their attention to the "military objectives" which are, in general, the supply sources of the armies and fleets which themselves are no longer a primary object of air attack. Rather, on all the evidence, they will set themselves to break the morale of the people upon whose willingness to continue the war all depends in the last resort. Their task will be, in fact, to create a "complex of defeatism" in the national mind of the enemy.

These remarks are taken by the author, Mr. Spaight, as quotations from certain eminent writers, English, French, and German. They represent the opinions and policies of those men who advocate unlimited war in the air. Were the words "air force" and "air power" replaced by the terms "submarine" and "submarine power," could you not look back to the days between 1914 and 1918 and see how the same arguments were used by those who advocated wholesale destruction through the agency of the submarine?

At the beginning of the war of 1914, none of the belligerents had sufficient aircraft for their ordinary tactical needs and, with the exception of Great Britain, never succeeded in reaching a point at which it was possible to dispose of an air force surplus to the requirements of the armies and fleets for their immediate needs. Further, Great Britain was also the only power which created an Air Ministry. At the end of the war the Royal Air Force had over 22,000 machines on charge, and was producing ninety airplanes a day. These are the statements of competent authorities, such as Sir Frederick Sykes, and Air Commodore Brooks Popham. In his work *Aviation in Peace and War*, published in 1922, Sir Frederick Sykes has pointed out that, as the

results of the demands of the army and navy for aircraft for strictly military purposes, it was only in 1918 that "we managed to secure a margin and formed the independent air force in June of that year." Long range bombing, he states, had already been decided upon in principle as early as 1915. By the time the Royal Air Force had been formed, London and other cities had already been bombed by the German *Gothas* in 1917, so that whatever may have been the opinion of military men as to the most effective use of aircraft, by 1918 there must have been in the hearts of the British people a desire to see some form of reprisal used against the Germans in retaliation for the ruthlessness which they had displayed in their air and in their submarine campaigns. Great as may have been the consternation of the Allies consequent to the German raids, the effect upon them was far less than the effect produced upon the Germans when the Allied bombing operations began to be effective. A quotation to this effect from Spaight, *Air Power and War Rights,* on the moral effect of the Allies' raids is as follows:

> Far profounded was the effect of the Allies' raids upon the Rhineland towns. As early as October, 1917, Herr Weissmann stated at the German Socialist Congress at Wurzburg that the people of Freiburg lived in terror of air raids. . . . . The German press of the last year of the war affords increasing evidence of the effect of the Allies' raids upon the morale of southern and western Germany. The demand for some international agreement banning the aerial bombardment of cities outside the war zone made itself heard with steadily growing force. In April 1918, the Second Chamber of the Bavarian Diet unanimously passed a resolution requesting that the Federal Council and the Imperial Government should be moved to open negotiations for the conclusion of a general agreement to secure immunity for such cities. In the same month, General von Stein, the Minister of War, was questioned upon this subject in the Reichstag and replied that the restriction of aerial attack to fortified towns had not been proposed by any enemy government and that Germany could not undertake such an obligation alone. On July 3, 1918, Herr Scheidmann proposed in the Reichstag that the German government should take the initiative in coming to an agreement with the Allied powers to abstain from bombing towns outside the war zone, but again the government declined to make the first move in the matter. Meanwhile, the demand for protection for the cities grew in volume and intensity.

You are thus able to see for yourselves how the independent Air Force came into being during the time when men's minds were thoroughly inflamed, when no thought of any restraint was placed

upon the fighting arms and, particularly, when due to the acts of the Germans themselves, retaliation was uppermost in the minds of the Allies. This seems hardly the time for men to form policies or to lay down rules as to how the military and the naval forces shall be used in any future war, for if we accept rules and policies begotten at such a time, the wars of the future are bound to be more lawless than those of the Middle Ages and instead of an advance in our western civilization we revert to the practices of barbarians.

5. *The Policies Urged by Advocates of a United and Separate Air Force*

The advocates of a separate air force in this country are particularly careful to introduce the term "National Defense." This term is a misnomer when applied to the marginal or separate air force, for of all the arms which may be used in war, the air force used alone, especially insofar as our country is concerned, is the least able to wage defensive war. Used as an auxiliary of the Navy or of the Army it may be defensive, depending upon the policy of the arm with which it is associated. But of itself, it cannot successfully wage defensive war. It is strictly a weapon of offense. In conformity with this view, I again quote from Spaight, who takes his ideas from such English writers as Maurice Baring, Wing Commander J. A. Chamier, and Squadron Leader Sutton:

> The idea that the possession of a strong air force, as of a strong fleet, is a guarantee of security was dealt with and refuted in a memorandum which was drawn up by the British Air Staff in conference in September, 1916. This memorandum points out that the airplane is an offensive and not a defensive weapon, and that it is utterly impossible to prevent hostile machines from crossing the line, "simply because the sky is too large to defend." "This," it states, "is the inevitable consequence of having to fight in three dimensions."
>
> "No air force," says a distinguished officer of the Royal Air Force, "can be expected entirely to prevent the enemy from crossing the lines. . . . . The events of the war itself demonstrated the truth of these statements. They show that the capacity of the British and French squadrons to pierce the German defense could not have depended upon the possession by the Allies of a superiority of air strength. Paris was most powerfully defended on the ground, and by the squadrons attached to the entrenched camp and lay, moreover, behind a frontier line of operating Allied aircraft. Yet all

her defenses were powerless to protect her from the German raids almost up to the end of the war.

The real purpose of those who advocate a separate air force may be gleaned from quotations taken from airmen who operated during the last war. These are competent men, who know exactly the policies they wish to establish, and the methods they desire to pursue to make these policies effective.

In an article on "air defense" in the *Edinburgh Review,* October, 1922, Sir Frederick Sykes prophesies that "in the wars of the future great air forces will at once strike . . . . with asphyxiating chemical bombs . . . . at the cities, homes, and factories of the enemy, if within range, thus creating panic, inaction, breaking his will, and reserve power at the source." "In future," he states, "it is the whole population that will bear the main shock of attack."

In *The Aeroplane,* August 1, 1923, Mr. C. C. Grey argues that in time of war all inhabitants, male and female, of the belligerent countries are or should be engaged in work which assists in some way the troops in the field, and are therefore proper targets for air bombs.

In *The Aeroplane* of July 11, 1923, Mr. C. C. Grey states: "The only effect an international bombing code can have is to cramp the style of the R.A.F. at the beginning of the war, just as the Hague Convention and the Geneva Convention cramped the style of the fighting men of the Navy early in the war 1914-1918. If we go into the next war with hair and teeth and blood, as the saying goes, free from any fetters of rules and regulations we may achieve quite useful results at the start."

René Fonck in *L'Aviation et la Sécurité Française* states in two or three weeks of war a city as large as Paris could be practically destroyed. . . . If in lieu of explosive bombs, gas bombs were used, the disaster would be immense.

Sir Walter Raleigh in the *Wars of the Air* states, "No people on earth, it may readily be admitted, can maintain the efficiency of its war activities under the regular, intensive bombing of its centers of civilization."

Oppenheim in *International Law* published in 1921, has made the statement: "The policy of bombing Germany was adopted as a reply to the attacks by German aircraft on English towns."

Mr. Bonar Law stated in the House of Commons, October 16, 1917, "There is no change of policy. It is our intention to employ our airplanes in Germany over German towns as far as the military needs render them free." An official statement published in *The Times* of October 1, 1917, had stated already that the fact that no bombing raids upon German towns were being carried out was due not to any reluctance to raid the enemy's towns, but to the military exigencies of the times.

The authority for the above statement is J. M. Spaight in *Air Power and War Rights.*

In *Winged Defense,* written by Colonel Mitchell, page 4: "Aircraft possess the most powerful weapons ever devised by man. . . . . As battleships are relatively difficult to destroy, imagine how much easier it is to sink all other vessels and merchant craft. . . . . In case of an insular power which is entirely dependent on its sea lanes of commerce for existence, an air siege of this kind would starve it into submission in a short time."

How about the submarine as it was used by Germany in the late war? The above quotation sounds very like the German practices of that period. As a result, England has persistently advocated abolition of submarines. At the Conference for a Limitation of Naval Armament, a treaty was made relating to the use of submarines, and noxious gases in warfare. France has not ratified this treaty. In it the submarine if used as indicated in the above quotation would be outlawed by the civilized world, and any person who violates the rules set forth in the treaty, regardless of whether he is acting under orders of a governmental superior, shall be liable to trial and punishment as if for an act of piracy and may be brought to trial before the civil or military authorities of any power within the jurisdiction of which he may be found.

How about the aircraft? Is it to be free from any restraint? Yet it is the one effective way in a military sense for the independent air force to operate. Is the law of expediency to replace the laws of war built upon hundreds of years of experience? Is the public law of the world to be overthrown because a few men, most of whom have a vested interest in the question, desire an independent air force for America under military ægis?

On page 5, *Winged Defense*—"For attacking cities that are producing great quantities of war munitions that are necessary for the maintenance of an enemy and country in case of war, the air force offers an entirely new method of subduing them."

On page 9, *Winged Defense*—"Such a place as New York for instance would have to be defended if attacked by hostile bombers."

Is New York a fit objective for attack because some munition factories may be in its vicinity? Are there no other interests to consider save the air interests? Apparently not if we listen to the advocates of the independent air force.

On page 16, *Winged Defense*—"Air forces will attack the centers of production of all kinds, means of transportation, agriculture areas, ports and shipping, not so much the people themselves."

Yet how can they do this without causing great loss of life to noncombatants?

There can be little doubt in the minds of those who read the above statements as to the purposes, policies, and the means, to be used by the men who advocate an independent air force. It is the only way in which it can exert direct military pressure when used independently and not in conjunction with other naval and military forces.

Whatever may be the real or the fancied needs of England and of the Continent, America's needs certainly are not the same. It is not possible for an air force to hop over the channel and to attack our centers of industry, for between us and the European Continent lie 2,500 miles of sea which no heavier than air aircraft, carrying incendiary and destructive bombs, has been able to cover. On our Pacific side there are 4,000 miles of water between us and the Asiatic Continent. We are extremely fortunate that geography has made it possible for Americans to stop and to ponder before they enter into any rash enterprises of a military character. Unlike other countries, less favorably situated, for us the need does not exist to embark upon an undertaking in the name of self-defense, before we measure and weigh the principles involved, and until we take steps adequately to safeguard any return to the barbarous practices of the past.

6. *The Results of Such Policies and Practices as Advocated Above*

It has been advocated that the unlimited use of the air would in reality be a humanitarian movement, tending to shorten wars, tending to make nations loath to enter war, and thus be beneficial in its general results. No force in such an argument can be seen. Peoples do not stop to argue or to reason when they decide to engage upon a war. The fear of defeat is rarely present at the beginning, and, even were it so, there may be a time when the popular indignation is so aroused that the peoples of a nation will stop short of nothing less than war.

The result of policies such as advocated above would be a radical departure from the established rules of international law built up in the course of so many years and a return to utter lawlessness with a consequent demoralization which would extend to the very roots of our western civilization.

In the Conference for a Limitation of Naval Armament, 1921-22, an attempt was made to find a formula whereby limitations could be placed upon aircraft, as were placed upon naval ships. But at that time no such formula could be found. The practical result is that today, while we are talking of limitation of armaments, the one arm which seeks to hold itself free from limitations is the air, and this freedom from limitations extends not only to types, sizes, and to numbers, but to methods of operation as well. Divorce the air as an adjunct of the naval and military forces, make it free to act as it will, and you have a state of affairs where no limitations as to numbers, policies, or practices has as yet been imposed. In other words, the sky is the limit and the air is free for unlimited competition in building and for unlimited operation in time of war.

At the Conference for the Limitation of Naval Armament, a resolution was adopted establishing a commission of jurists to consider amendments of the laws of war. The questions to investigate were as follows:

a) Do existing rules of international law adequately cover new methods of attack or defense resulting from the introduction or development, since the Hague Conference of 1907, of new agencies of warfare?

b) If not so, what change in the existing rules ought to be adopted in consequence thereof as a part of the law of nations?

As a result, certain laws relating to the use of aircraft have been drawn up. These rules follow closely the law applicable to naval craft and to the usage prescribed for the military forces in the field. To date, these rules have not been formally adopted through agreement and ratification.

Our Present Policy

The President appointed a board to investigate the question of air power and to indicate what reforms were deemed essential. This board was composed of eminent men. On it there was but one naval man, a distinguished retired officer of calm judgment, and high mental attainment. There was only one military man, a distinguished officer who served under Pershing and who has since left the service and is now in employment in civil life. This board put in an unanimous report and declared that the present policy which America is carrying out with regard to its air forces, with certain minor modifications, is sound. It reported against a

separate air force.[1] The Board had access to all documents, and were in touch with public opinion. It examined many witnesses. Its opinion was a carefully thought out decision. These men had no axes to grind. They gained nothing; they lost nothing by their decision. It was a fair, impartial, unbiased court. Can the pleaders for an independent air force say as much for themselves?

Finally

Let us take the three suggestions of Colonel Mitchell and discuss them in brief:

1. There should be a Department of Aeronautics charged with the complete aeronautical defense and the aeronautical development of the country.

The Navy believes in a Department of Aeronautics but thinks it should be a civil department under the Bureau of Commerce. It believes this to be the best way to develop the aeronautic possibilities of our country. It maintains that our aeronautic defense is amply cared for now by the two military arms and if ever it be necessary to take extra measures the civil air arm can be mobilized then and like our militia, state troops, and naval reserves, may be made available for the emergency.

2. There should be an aeronautical personnel entirely apart from the Army and Navy.

The Navy maintains the same stand but believes that it should be under civil and not military ægis.

3. That there should be a Department of National Defense with subheads for the air, Army, and Navy.

The Navy is in accord with the findings of the President's Air Board in all respects as relates to the Department of National Defense and to the subheads for the three departments.

To Sum Up

The present policy of the Navy is to develop aviation as an arm of the fleet, and as one of its most valuable adjuncts. It is the purpose to use this arm so that mastery of the air may be gained in the area of war operations. The Navy is one of the best friends that aviation has, and one of its foremost pioneers, but the Navy

[1] EDITOR'S NOTE: *Vide* Report of President's Aircraft Board, Page 196, January, 1926, PROCEEDINGS.

does not advocate the formation of an independent military air force under the specious term National Defense nor does it approve of the use of aircraft in a lawless way far beyond the limits set by the rules for international law. It does advocate the three separate forces, the military air force, the naval air force, and the civil air force used for commercial purpose. We advocate that the same rules which apply to all naval craft shall be extended to aircraft. We believe further that the limitations imposed upon our armament in proportion to the 5-5-3 ratio should apply to all types of ships, including the aircraft. Finally, it believes in nothing which would tend to place military authority over civil authority, which is contrary to the spirit of our government, which is untrue to the traditions and character of the American people, which would be a step toward undermining our western civilization, and which might impose upon our government a danger graver than that which the framers of our Constitution foresaw when they made the law and placed restrictions upon our military forces.

In this way, the Navy has voluntarily accepted the spirit which was imposed upon it by the treaty for the limitation of naval armament, and although the limitations did not include aircraft, nevertheless the Navy is in a straight-forward manner endeavoring to apply these principles throughout the naval service.

If ever there be a need for a united air service later, when planes have developed the capacity to fly through distances so great that alone and unaided they may encompass the world, when efficiently they may pass from shore to shore over to the great continents separated by thousands of miles of water, then perhaps the need for a separate military air service may exist, but for America it does not exist today. If that time ever comes, then will the nucleus of the united air force be gathered from the present military arms supplemented by our civil air force. It will then come into being with none of the atmosphere which surrounded the present Royal Air Force when it was born. By that time, it is hoped, sufficient limitations, through the adoption of rules for aerial warfare, will have been imposed so that a return to barbarism will be impossible.

Before we Americans, who love our country and the ideals which it advocates, enter thoughtlessly upon any course of conduct which is extremely doubtful as to its wisdom; before we accept the

pleas of the advocates of the united air force, let us say rather, first make the rules of war so that ruthlessness may not result, even if arbitration is refused or fails. Failing to make adequate rules applicable to all nations, we might, as between another belligerent and ourselves, even agree voluntarily not to commit in the name of expediency lawless acts. Let us stand always for decency in war, and not in time of peace be advocates of a measure which does not.

Which is the better way? To adopt, on the impulse, a scheme which may commit us to a course of action contrary to our traditions and to our laws, contrary to our habit of thought, and to the character of the American people, or is it wiser to make the laws first, develop gradually the civil air force and then later when matters are stabilized to use this great air force as best befits the occasion if the need comes? When Americans know the inside of the history of the air force, when they see more of its policies laid before them in plain, startling statements, will they agree to commit themselves now or will they pause and think and choose the better way? Will they say then let us abide by the decision handed down by the President's Board?

THE AIRPHOBIA OF 1925

By Lieutenant Commander C. A. Pownall, U. S. Navy

"The Ocean is no Place for Amateurs"

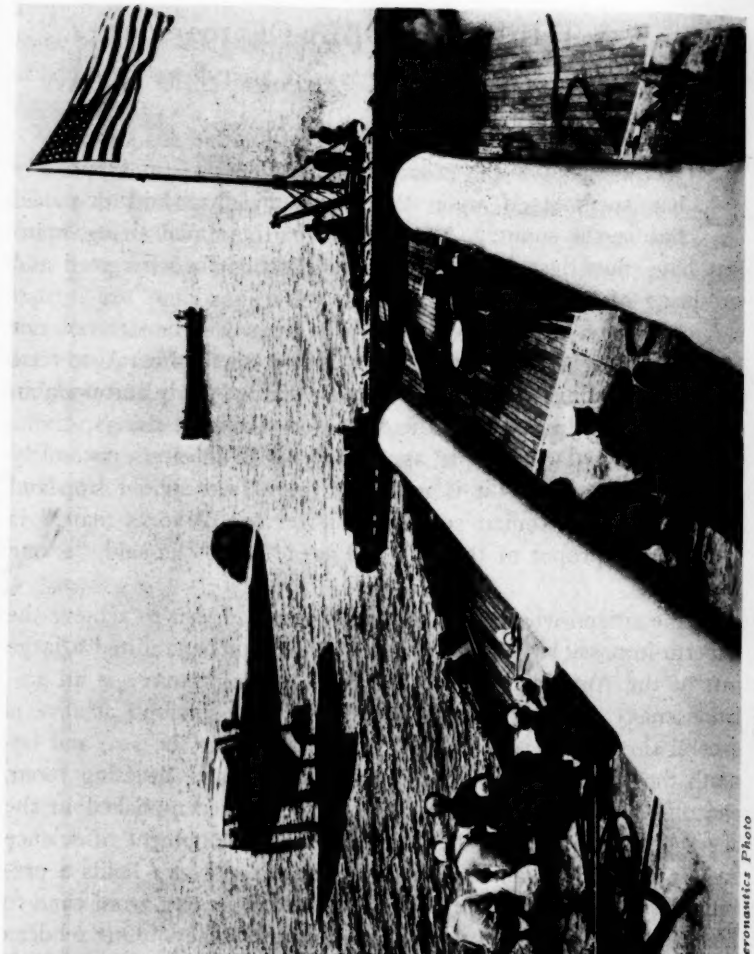
LIKE a typhoon the recent storm of inquiry and publicity has spent itself upon the Navy and has laid it naked before the country. As a result of this naval airing, opinions have doubtless been formed concerning the character and well-being of the Navy.

A conception of the true state of affairs will be derived not from a casual glance at a newspaper, but from the liberal exercise of one's reasoning faculties, based upon mature study and upon an unprejudiced delineation of the right and wrong of things.

In this day of newspaper syndicates—with interests not solely connected with news—it is well that the citizen should stop and think. The old Roman senator's answer to "Who is man?" is particularly apropos of this day and age: "Man," he said, "is one who thinks."

To the citizen who thinks, it should be noted that to achieve the hitherto impossible in many fields of endeavor constituted a large part of the American Navy's log for 1925. His navy is an ambitious navy. It is typically American. The spirit to achieve is general throughout the service; on the sea, over the sea, and beneath the sea, and also in laboratory, navy yard, drafting room, and office. We little realize what is really accomplished in the aggregate. As a huge laboratory for the development of science and engineering in all its fields, the American Navy holds a preëminent position. The price we are obliged to pay from time to time is the unforeseen sacrifice in men and money. Our modern implements are potentially dangerous. To develop them to their maximum possible use leads us into unexplored fields and entails risks—risks which the naval personnel recognizes and accepts as part of the job.

The thinking citizen must also realize that the naval personnel constitutes a very strong organization in itself. Loyalty and in-



Bureau Aeronautics Photo

SEAPLANE CATAPULTED FROM BATTLESHIP

tegrity of purpose are undisputed qualities. During the past storm of controversy, the naval personnel has been charged before the people with negligence, corruption, and so forth. It has withstood the severest and most far-reaching public trial in history, and withal, a *corpus delicti* was not established. The verdict handed down by its jurors was—"not guilty."

It has been a trying year, and a sad year. We have lost beloved shipmates, classmates, and friends. We have witnessed the attempts made to divide the Navy against itself, to belittle the experience, ability, and even the integrity of those of high command and responsibility. We have witnessed an attempted dramatization of our national defense. In all, it was a storm that wreaked its fury upon the very bulkheads of the Navy, the loyalty and integrity of its personnel. Fortunately for our air arm, fortunately for the Navy, the bulkheads were strong.

Having weathered the past storm fairly successfully, where are we now? What is our position? What course shall we take or be forced to take?

In the first place, in view of our casualties, shall we slow down and accept a policy of "safety first," or shall we still accept old Moltke's motto—"First weigh, then venture"? There is but one answer in the mind of the navy personnel—"Proceed."

After the smoke of the aerial bombardment of 1925 has cleared away, there is left to us and to posterity some dozens of volumes of evidence, not to mention the various and diversified opinions of courts, boards, committees, and the written word of both enlightened and unenlightened individuals. We find in our brain wreckage after the storm, as we enter the year 1926, a few generally accepted conclusions:

1. That our firesides are not in immediate danger from an enemy air raid.
2. That naval aviation has not been totally without merit.
3. That retrogression has not set in.
4. That we still need a fleet composed of aircraft, surface craft, and sub-surface craft.
5. That discipline, loyalty, knowledge, and common sense are indispensable to our Navy.
6. That we really ought to stop talking and concentrate upon more productive labors.

SEAPLANE CATAPULTED FROM BATTLESHIP

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Notwithstanding the above, the air around Washington is still charged with a latent and perplexing ether—call it nerves. There is not much tangible consensus of opinion as to what action is really vital or necessary. But the nervous ones are clamoring for some opiate, good or bad, to alleviate the tension. In this overcharged atmosphere the true and serious question is not what is the Navy going to do for aviation, but rather what is aviation in the hands of an overwrought Congress about to do to the Navy.

No less than two public tribunals have attempted to diagnose the ailments of naval aviation and to prescribe medicine in the form of new legislation, to be taken by the Navy to develop properly this organ. There is considerable conflict in the prescriptions suggested. A positive and consistent diagnosis is not available. The question that now comes to mind is, what would be the pathological reaction of the Navy as well as its important organ, aviation, if, in a dash of overwrought nerves, the body, navy, were obliged to swallow the concocted legislative pills of any one board or both. If such a thing were probable (we trust that it is not), it might readily become a case of an overdeveloped organ killing the body from which it derives nourishment. In other words, a tumor.

The doctors have, in their wiser moments, prescribed certain exercises which the Navy may have overlooked, regarding aviation development. Assuming that administrative exercise is much more healthy and less objectionable in the long run than legislative medicine, would it not be the better and safer course to let the Navy carry out the program of calisthenics suggested, together with others which will doubtless be forthcoming from the Navy itself?

In this day of expert advisers, and naval diagnosticians, it is not out of place to call particular attention to a class of naval men who, though not readily discernible at first glance, nevertheless do exist. For the sake of a name, we will rate them under the title of "Qualified Naval Officers." To this class of men, such words and phrases as loyalty up, loyalty down, loyal initiative, discipline, *esprit de corps,* unity of command, mission and decision, authority and responsibility, coordinated action, the good of the service, aviation for the fleet, the fleet for aviation, submarines for the fleet, the fleet for submarines, and so forth, all have a distinct, and sacred meaning throughout their naval life. They are men who

stand not alone by virtue of rank, but in the hearts and minds of their contemporaries, by virtue of what they know and do. Knowledge and common sense constitute their compass. They possess no overdeveloped complex or ambition. They are not self-sufficient. They admit the inability to see through a submarine periscope or an airplane bomb sight from the bridge of a battleship, and contrariwise, the inability of any one to see through a conning tower peephole from an airplane or submarine. They worship at the shrines of knowledge and sincerity of purpose. They perform a full day's work. They go abroad from their appointed job in order to keep abreast of the times in naval developments. They study the Navy as a coach does a football team. As particularly evidenced during the past year, the percentage of the qualified naval officer as described above, is as large in the air and staff arms of our Navy as it is in the line. Fortunately, or unfortunately, these men are not particularly skilled in witness stand tactics. They are toilers of the sea, not sea lawyers.

The country in the past, particularly in time of war, has pinned its faith on these men and that faith has been justified. If, despite the clamorings of the Navy's busybodies, the country can see fit to continue that faith, and permit the Navy to work out its aerial salvation, in its appointed and duly constituted way, the Navy and naval aviation together as one will continue efficient, useful, strong, and productive of results. If, on the other hand, there is legislated into being a corps or a class of superimposed individuals, then the day and the usefulness of the so-called qualified naval officer is past.

Let us weigh, then venture, over the sea, on the sea, and under the sea, *together*.

SHIPS THAT ARE NO MORE

By Wallace S. Wharton, Lieutenant (jg) U.S.N.R.

BY THE terms of the Washington Naval Arms Treaty, and the scrapping of four obsolete ships prior to the conference, thirty gallant craft bearing the names of various states of the Union have disappeared from the active navy list, and now take their place in the history of the past. Many of these names hold places of long standing in the annals of the Navy, some of them having originated at the time of the American Revolution, and many of them possessing illustrious records in the subsequent naval wars.

On February 17, 1925, the work of scrapping the ships by the terms of the Washington Treaty was completed, and 733,540 tons of fighting ships, of which 465,800 tons represented new ships under construction, had either been reduced to metal, for use in the industries of the nation, or sunk as the result of target practice. In other words, a goodly number of our naval swords have been beaten into plowshares.

The treaty provided for the scrapping of twenty-eight vessels of the Navy, of which seventeen were old battleships, ranging from thirteen to twenty years of age; seven, uncompleted superdreadnaughts, and four uncompleted battle cruisers. The older ships stricken from the Navy list comprise such illustrious names as *Maine, Missouri, Virginia, Nebraska, Georgia, New Jersey, Rhode Island, Connecticut, Louisiana, Vermont, Kansas, Minnesota, New Hampshire, South Carolina, Michigan, Delaware,* and *North Dakota.* The new superdreadnaughts were to have borne the names of *Washington, South Dakota, Indiana, Montana, North Carolina, Iowa,* and *Massachusetts;* while the battle cruisers ordered junked on the ways were the *Constitution, Constellation, United States,* and *Ranger.* The *Oregon* and *Illinois* were exempted from scrapping for use for nonmilitary purposes.

Of the entire aggregation scrapped under the treaty, but four were honored to go down to Davy Jones' locker under gun fire.

The *Virginia* and *New Jersey* were turned over to the Army for targets, and sunk by bombing from aircraft, while the *North Dakota* was reserved as a target ship. The *Washington* received her *coup de grace* from her own kind off the Virginia Capes, and now rests in deep water.

Sinking of the *Washington* was fraught with special interest in naval circles for the reason that she was the first and only post-Jutland ship to be so tested. The test was made as an experiment so that naval constructors of the United States Navy would have available data for designing ships with high resisting qualities when the time comes for the replacement of ships now in the battle line. The ship had all of the structural improvements made after the weakness of the pre-Jutland battleships had been demonstrated May 31, 1915. She withstood the underwater attacks from torpedoes fired in contact with her sides. The ship was actually sunk by the gun-fire of the *U.S.S. Texas.*

With the exception of these four, the ships were first rendered unfit for military use by removing all armament, radio and fire control apparatus, and then broken up for the metal in them. This metal was cut up in such shape and size as to be easily handled for shipping and in due course of time will be restored to the nation in the form of implements for peace time work.

Fourteen of the ships were sold to contractors "as is and where is," meaning that, after the guns and other fighting equipment had been rendered useless, the contractor purchased the ship as she stood and in whatever navy yard she was moored, and then had to remove her and break her up at his own expense. Prices obtained for these ships ranged from $37,110 for the *Nebraska,* with a displacement of 14,948 tons, to $66,560 for the *Louisiana,* with a displacement of 17,666 tons. Contractors first inspected the ships to ascertain the probable amount of useful metal and the condition it was in. Sealed bids were then submitted, and the sale made to the highest bidder.

Ten of the ships were broken up by the Navy in various yards, and the metal then sold by the competitive bid system. In the case of these ships the amount received for the metal was much higher than that received for the ships sold "as is and where is" to contractors. Five ships, the *Michigan, Minnesota, Kansas, Delaware,* and *South Carolina,* were scrapped at League Island Navy Yard, Philadelphia, and the sale of metal brought

$1,089,371.80. The cost of scrapping them was $584,598.34, leaving a profit of $504,343.01, or about $100,000 per ship, as compared with $66,560, the top price obtained for a single ship to be junked outside the yard.

For the ten ships scrapped by the Navy a clear profit of $832,578.08 was received. Of this number five were ships that were not completed, but were broken up on the ways. All told the amount received from the sale of metal and ships totaled $1,410,289.84.

It is estimated, by the Secretary of the Navy, that the total cost of junking the ships amounted to $28,000,000, or one million dollars per ship. This includes the cost of cancelling contracts for ships which were under construction at the time of the conference.

The four ships of the battle line bearing state names that were stricken from the Navy list prior to the conference were the *Alabama, Kentucky, Ohio,* and *Wisconsin.*

The full scope of the treaty results can be appreciated when one considers that of the ships bearing state names we had forty-eight, but now there are only eighteen on the active list. Scrapping of thirty ships is by no means an idle gesture.

In reviewing the names that have played such an illustrious part in the history of the Navy, but which are no longer to be found on the active list, the names *Constitution, Constellation, United States,* and *Ranger,* gallant ships all, need no comment. Their records are too well known to require more than passing mention, that they too may be remembered, and honored, by those holding the traditions of the service at heart.

Of the other ships perhaps none has such a great element of interest as the *Michigan.* Two ships of the Navy have carried the name, and by some strange bit of fate, the first ship still floats while her namesake has been reduced to the ignominy of junk. In 1844 a paddle-wheel steamer was launched on Lake Erie, bearing the name *Michigan.* This ship had an armament of eight guns, and was used as a patrol boat during the Civil War. In 1905 her name was changed to *Wolverine,* and as such she is known throughout the length and breadth of the service, especially by members of the naval reserve force on the Great Lakes, for she has been in the service all these years, and still is. The second *Michigan,* the one junked, was launched May 26, 1908, and was commissioned in 1910. She saw duty in Cuban and Mexican

waters and during the World War was in the ocean escort service. The *Michigan,* and her sister ship, the *South Carolina,* were both projected before the British *Dreadnaught* and may be considered as the first "dreadnaughts," or all big gun ships.

Alabama is another illustrious name that is no longer to be found on the Navy list. While she was not, properly speaking, junked in accordance with the treaty terms, her history is none the less interesting. She is one of the few ships that met their fate under fire, being sunk in 1921 as a target ship for bombing by aircraft. The first *Alabama* was built following the Act of March 3, 1819, and was a seventy-four-gun ship of the line. Prior to launching, at Portsmouth, New Hampshire, the name was changed to *New Hampshire,* and later to *Granite State.* This ship was used by the New York Naval Militia as an armory, and was destroyed by fire May 23, 1921, as she lay at her berth at the foot of Ninety-sixth Street. A steamer, purchased by the Navy in 1848, also bore the name *Alabama.* The third vessel of the United States Navy to have the name was a wooden steamer equipped with paddle wheels, purchased by the Navy in 1861 and serving in the Civil War. She was sold at auction in 1865. The same name was carried by a cruiser of the Confederate Navy. This ship did active duty as a commerce destroyer and was sunk in battle with the U.S.S. *Kearsarge* off Cherbourg, France. In 1900 the fourth *Alabama,* the one sunk by bombing, was commissioned. This ship was one of the armada making the world cruise in 1908.

Six ships have borne the name *Connecticut,* the last being the battleship which carried the flag of Rear Admiral Robley D. Evans when the world cruise fleet left Hampton Roads in 1908. This ship was launched at New York Navy Yard September 29, 1904, and was christened by Miss Alice Wells, granddaughter of Gideon Wells, Secretary of the Navy during the Civil War. The first *Connecticut* was a gondola of three guns and served under the command of Benedict Arnold in the naval battle off Valcour Island in Lake Champlain in 1776. The ship was burned after the battle to prevent her being captured by the British. The second ship so named was a sloop of eight guns, fitted out by the Colony of Connecticut in 1776. In 1790 the third *Connecticut* was purchased from the district of Middletown, Connecticut, and served in the fleet of Commodore Truxtun in the West Indies from 1799 to 1800. This ship was a sloop of war mounting twenty-four

guns. The fourth ship was a side wheel steamer of 1725 tons purchased by the Navy in 1861, and was originally named *Mississippi.* During the Civil War this craft served with the Atlantic and Gulf squadrons as supply steamer, and captured twelve valuable prizes. The fifth ship to bear the name was being built at Boston, first as the *Pompanoosuc,* but was never launched, being broken up on the stocks in 1884.

There have been six *Delawares* in the Navy, and by a queer turn of fate the first fought against the British in the Revolution, and the last took its place as a unit of the Sixth Battle Squadron of the British Grand Fleet during the World War. The first *Delaware* was authorized in 1776 by the Marine Committee and was a ship-rigged vessel mounting twenty-four guns. She saw active duty in the Revolution under the command of Charles Alexander and took part in the destruction of H.B.M. Ships *Augusta* and *Merlin.* She was later captured by the British. The second ship to carry the name was purchased in 1798 and was a ship of 321 tons mounting twenty guns. During the naval war with France she was commanded by Stephen Decatur and captured a number of French ships. This vessel was sold at Baltimore in 1801. In 1820 the third *Delaware,* a ship of the line of 2,633 tons, seventy-four guns, was launched at Gosport (Norfolk) Navy Yard. From 1828 to 1841 she served with the Mediterranean and South American squadrons. She was burned at Gosport at the outbreak of the Civil War to prevent her falling into the hands of the Confederates. The fourth *Delaware* was a paddle-wheel steamer of 357 tons, purchased in 1861. This craft saw active service with the North Atlantic Squadron during the Civil War and assisted in the capture of Roanoke Island, North Carolina, in 1862. She was sold in 1868. The fifth ship so named was launched at Portsmouth, New Hampshire, as the *Piscataqua* in 1863, but in 1869 the name was changed. She saw service in the Asiatic squadron and was sold in New York in 1877, after having served for several years as quarantine ship for that port. The sixth, and last *Delaware* was launched February 6, 1909. She had a displacement of 20,000 tons and was at the time of launch the latest word in battleship construction.

The *Georgia* was the first ship to bear the name in the Navy, and the last. She was launched October 11, 1904, and made the

world cruise in 1908. During the World War she was in convoy service.

Two ships have borne the name *Illinois,* the first being a steam sloop of 2,200 tons. This ship was never launched, but broken up at Kittery, Maine, in 1872. The battleship that bore the name was launched at Newport News, Virginia, October 15, 1898. For a time she served as flagship on the European station and made the world cruise. She has been transformed into a floating armory for the New York Naval Militia, her guns and engines being removed and a wooden housing built over her.

While one of the superdreadnaughts broken up on the ways as a result of the treaty had the name *Indiana* assigned, but one ship has borne the name on the active list. This ship was one of the proud ships that made up the backbone of the Navy at the time of the war with Spain. Under the command of Captain Henry C. Taylor she was one of Sampson's squadron at the battle of Santiago, July 3, 1898. The ship was launched in 1893, and met her end in 1920 as a target for experimental firing of the Navy's big guns.

The name *Iowa* suffered the same fate as that of *Indiana,* in that the name was to have been carried by one of the new superdreadnaughts, and that the ship to carry the name on the active list was sent to the bottom of the ocean as a target for the fleet. The first *Iowa* was a battleship and was launched in 1896. Under the command of Captain Robley D. Evans she took part in the battle of Santiago. She was sunk by gun fire from the *Mississippi* during the fleet maneuvers of the winter of 1923. The practice was unique in that the *Iowa* was equipped with radio control so that she steamed about as though fully manned, during the firing.

The *Kansas,* recently junked, was the second ship to bear the name, the first having been a gunboat built at Philadelphia in 1863. This ship was sold in 1883. The second and last *Kansas* was launched August 12, 1905, and was christened by Miss Anna Hoch, daughter of the governor of Kansas at that time. The ship took part in the world cruise of 1908 and during the World War served with the Atlantic fleet.

The *Kentucky* was the first ship to bear the state name, and the last. This ship was launched March 24, 1898 and was christened by Miss Christine Bradley, daughter of the governor of Kentucky. From 1901 to 1903 the *Kentucky* served on the Asiatic station.

She took part in the world cruise and was placed out of commission in 1912. She was recommissioned in 1915 and during the World War served with the Atlantic Fleet.

The first of the three ships to be named *Lousiana* was purchased at New Orleans in 1812. She was used as a dispatch boat during the War of 1812, and rendered distinguished service in the Mississippi River at the time of the battle of New Orleans. She was broken up in 1821. The second *Louisiana* was a screw steamer purchased by Rear Admiral DuPont at Philadelphia in 1861. Laden with gun-powder she was blown up under Fort Fisher on December 24, 1864. The third, and last, *Louisiana* was launched at Newport News, August 27, 1904, and was christened by Miss Juanita La Lande of New Orleans. The ship made the world cruise in 1908 and saw active service in Mexican waters in 1914. During the World War she was engaged in the convoy service.

Launching of the first *Maine* was quite an event for the United States Navy, for the ship was the first battleship to be built by this government. She was launched at New York, November 18, 1890, and was christened by Miss Alice Tracey. She met her fate on February 15, 1898, in Havana harbor, being mysteriously blown up—the explosion being the first direct cause of the War with Spain. The second *Maine*, now reduced to junk, was launched at Philadelphia in 1901 and was christened by Miss Mary Preble Anderson of Portland, Maine. This ship made the world cruise in 1908 and during the World War served with the Atlantic Fleet.

Five ships of the Navy have been named after the Bay State but, with the junking of the superdreadnaught *Massachusetts*, the name is no longer found among the fighting ships. The first ship so named was a twin screw steamer, originally built for the Army. This ship was built in 1845 and transferred to the Navy in 1846. She served on the Pacific Station during the war with Mexico and prior to the Civil War her name was changed to *Farralones*. The second *Massachusetts* was a supply ship that served during the Civil War. She was sold in 1867, at the same time the *Farralones* was disposed of. Built as the *Passaconaway* the third ship was an iron-clad monitor. She was completed at Portsmouth, New Hampshire, in 1866 and broken up in 1884. The fourth ship was a battleship of 10,188 tons and was launched in 1893. Under the command of Captain F. J. Higginson she took part in the bom-

bardment of Santiago de Cuba, but due to her absence for fueling did not participate in the destruction of the Spanish Fleet. This ship was transferred to the Army in 1921 and used as a target for coast defense guns.

The first *Minnesota*, one of two ships to carry the name, saw very active service both before and during the Civil War. The ship was a steam frigate of 3,200 tons and was launched in 1855. From 1857 to 1859 she was attached to the East India station, now known as the Asiatic station. On her outward bound cruise she carried W. B. Reid, United States Minister to China. This cruise, which terminated May 28, 1859, resulted in various treaties between the United States and the countries of the Orient. During the Civil War she was flagship of the expedition against Forts Hatteras and Clark, and against Hatteras Inlet, North Carolina. On March 8, 1862, she fought against the *Merrimac* in Hampton Roads and later took part in the attack on Fort Fisher. After the Civil War she saw service in the North Atlantic and in 1901 was burned for junk. The battleship *Minnesota* was launched in 1905 and commissioned in 1907. She saw active duty both in Cuban and Mexican waters and during the World War served with the Atlantic Fleet, and in 1918 was disabled off Delaware Bay by running afoul of a mine planted by a German submarine.

Three *Missouris* have had their place in the Navy, though now the name is but a memory. The first of that name was a steam frigate of 1,700 tons mounting ten guns. She was launched in 1841 and in 1843 was destroyed by fire at Gibraltar. The second *Missouri* was surrendered to the Navy by the Confederates at Red River in 1865 and was sold in the same year. The last ship of the name was launched at Newport News December 26, 1901. In 1906 this ship went to the relief of sufferers from the earthquake in Kingston, Jamaica. In 1908 she made the world cruise under the command of Captain Robert Doyle, and during the World War served with the Atlantic Fleet, based at Yorktown, Virginia.

While but one ship has actually borne the name of *Montana* in the fleet, two have had the name assigned them, the last being one of the superdreadnaughts building at the time of the conference. The first *Montana* was a cruiser of 14,500 tons and was launched at Newport News in 1906. During the World War the *Montana* saw active duty in the convoy service. Her name was changed to *Missoula* June 7, 1920.

There have been three ships named *Nebraska* on the Navy list, the first of which was a steamer of 2125 tons laid down in 1869. The second ship to bear the name was an armored cruiser, the name of which was changed, prior to launching, to *Pennsylvania*, and still later to *Pittsburgh*. The third and last ship so named was a battleship of 14,984 tons, launched at Seattle in 1904. This ship joined the world cruise fleet on the Pacific Coast and completed the cruise. During the World War she saw duty with the Atlantic Fleet.

The first *New Hampshire* was originally named *Alabama*, but prior to launching the name was changed. She was launched in 1864 and saw duty with the South Atlantic Squadron during the latter days of the Civil War. The name was later changed to *Granite State*, as mentioned before in this article. The second and last *New Hampshire* was a battleship of 16,000 tons and was launched at Camden, New Jersey, June 30, 1906. Miss Hazel McLane, daughter of the Governor of New Hampshire, was the ship's sponsor. The ship saw active duty with the Atlantic Fleet at Vera Cruz in 1914, and during the World War with the Atlantic Fleet and in the convoy service.

Treaty terms eliminated the sole representative of the state of New Jersey by providing for the scrapping of the battleship bearing the name. This ship was launched at Quincy, Massachusetts, in 1904 and was christened by Mrs. William Kinney. The ship made the world cruise in 1908 and during the World War served with the Atlantic Fleet.

Counting the superdreadnaught, scrapped according to treaty terms, three ships have borne the name of *North Carolina*. The first was a frigate of seventy-four guns and was launched in 1820 at Philadelphia. The ship cruised in the Mediterranean and the Pacific until 1866. In 1867 she was sold. The second *North Carolina* was an armored cruiser of 14,500 tons and was launched in 1906. During the World War this ship did duty in the convoy service. Her name was changed to *Charlotte* in 1920.

North Dakota is another state that lost her sole representative through junking orders. The *North Dakota* was launched at Quincy, Massachusetts, November 10, 1908, and commissioned in 1910. She had a displacement of 20,000 tons. During the World War she saw service with the Atlantic Fleet. She has been reserved from the scrap heap to be used as a target.

Three *Ohios* have taken their place in the Navy, the first being a schooner built on Lake Erie in 1813 and captured by the British on August 12, 1814. The second ship so named was a ship of the line of 2,737 tons, launched at Brooklyn Navy Yard in 1820, but not commissioned until 1830. This ship was sold in 1883. The third and last *Ohio* was a battleship of 12,500 tons and was launched at San Francisco in 1901. For a time she was stationed in Asiatic waters and completed the world cruise with the fleet. During the World War she served with the Atlantic Fleet.

By terms of the treaty the *Oregon*, former bull dog of the Navy, was reserved as a historical relic, and has been turned over to the state of Oregon for keeping and is now in the Portland, Oregon, harbor. This ship, famous for her run around Cape Horn in the early days of the War with Spain, was launched at San Francisco in 1896. She took part in the destruction of the Spanish Fleet at Santiago de Cuba. She is the second ship of the Navy to be so named, the first having been a brig built on the Columbia River in 1845.

Two ships have borne the name of *Rhode Island*. The first was a brig of 1517 tons purchased at New York in 1861. After serving throughout the Civil War she was sold at auction in 1867. The second *Rhode Island* was a battleship of 14,948 tons. She was launched at Quincy, Massachusetts, in 1904 and was christened by Mrs. F. C. Dumaine. The ship made the world cruise in 1908 and saw service both in Mexican waters in 1914 and during the World War. She was placed out of commission at Mare Island in 1920.

South Carolina is a name that has been borne by three ships of the Navy, the first being a schooner of twelve guns built at Charleston, South Carolina, in 1798, and serving in the West Indies until 1800. The second ship to bear the name was a steamer of 1,150 tons, mounting six guns, purchased at Boston in 1861. During the Civil War this ship served with the South Atlantic Squadron, and made several captures. She was sold in 1866. The last *South Carolina* was a battleship of 16,000 tons. She was launched July 11, 1908, and was christened by Miss Frederica Ansel, daughter of the governor of South Carolina. The ship did active cruising duty in the West Indies and Mediterranean, and in 1914 in Mexican waters. During the World War she served with the Atlantic Fleet.

The superdreadnaught *South Dakota,* building at the time of the conference, would have been the second ship to have borne the name on the active list. The first was an armored cruiser of 13,600 tons, launched July 21, 1904, at San Francisco. During the World War the *South Dakota* served under Admiral Caperton in the South Atlantic patrol, and in ocean escort work. On June 7, 1920, her name was changed to *Huron,* and at present she is flagship of the Asiatic Fleet.

Scrapping of the battleship *Vermont* removed the second ship to bear the state name from the Navy list. This ship was launched at Quincy, Massachusetts, August 31, 1905, and was christened by Miss Jennie Bell, daughter of the governor of the state. The ship made the world cruise in 1908 and in 1914 was at Vera Cruz during the trouble with Mexico. During the World War she served with the Atlantic Fleet. The first *Vermont* was a ship of the line of 2,633 tons. She was launched in 1848, but kept in reduced commission until the outbreak of the Civil War, when she was assigned to the South Atlantic Squadron. From 1864 to 1901, when she was stricken from the Navy list, she served as receiving ship at Brooklyn Navy Yard.

Five ships have borne the name of *Virginia,* the first being a sloop of war mounting twenty-eight guns and built in 1776. This ship was captured by the British, in Chesapeake Bay, in 1778. The second *Virginia* was an armed schooner serving in the naval war with France. The name was also assigned to a sailing ship that was commenced in 1818, but was never completed, being broken up in 1874. The fourth ship so named was captured from the Confederate Navy in 1863, and saw service afterwards in the West Gulf Squadron. She was sold in 1865. The battleship *Virginia,* last of the line, was launched in 1904, and christened by Miss Gay Montague. This ship made the world cruise in 1908 and saw active duty in Mexican waters in 1912 and 1914. During the World War she served with the Atlantic Fleet.

The superdreadnaught *Washington* was the fifth ship to have borne that illustrious name. The first was a galley, mounting eight guns, which was captured during a running fight with the British on Lake Champlain on October 13, 1776. She was one of the squadron commanded by Benedict Arnold. The second *Washington* also fell into the hands of the British, but before she had been completed and her armament mounted. This ship was

launched at Philadelphia in 1776 and captured in 1778. The third *Washington* was a ship of 2,259 tons, seventy-four guns, built at Portsmouth, New Hampshire, and launched in 1814. This ship cruised the Mediterranean and other stations until broken up in 1843. The last ship in active commission to carry the name was an armored cruiser of 14,500 tons, launched March 18, 1905, at Camden, New Jersey. During the World War she saw active duty in the convoy service, and was also the first air craft tender. In 1916 her name was changed to *Seattle,* and at present she is administrative flagship of the commander-in-chief of the United States Fleet.

But one ship has borne the name of *Wisconsin,* and she is no longer on the Navy list. This ship was a battleship of 11,552 tons, launched at San Francisco November 26, 1898, and was christened by Miss Elizabeth Stephenson. The ship made the world cruise in 1908, and during the World War served with the Atlantic Fleet.

THE EVOLUTION OF A NAVAL MUSEUM

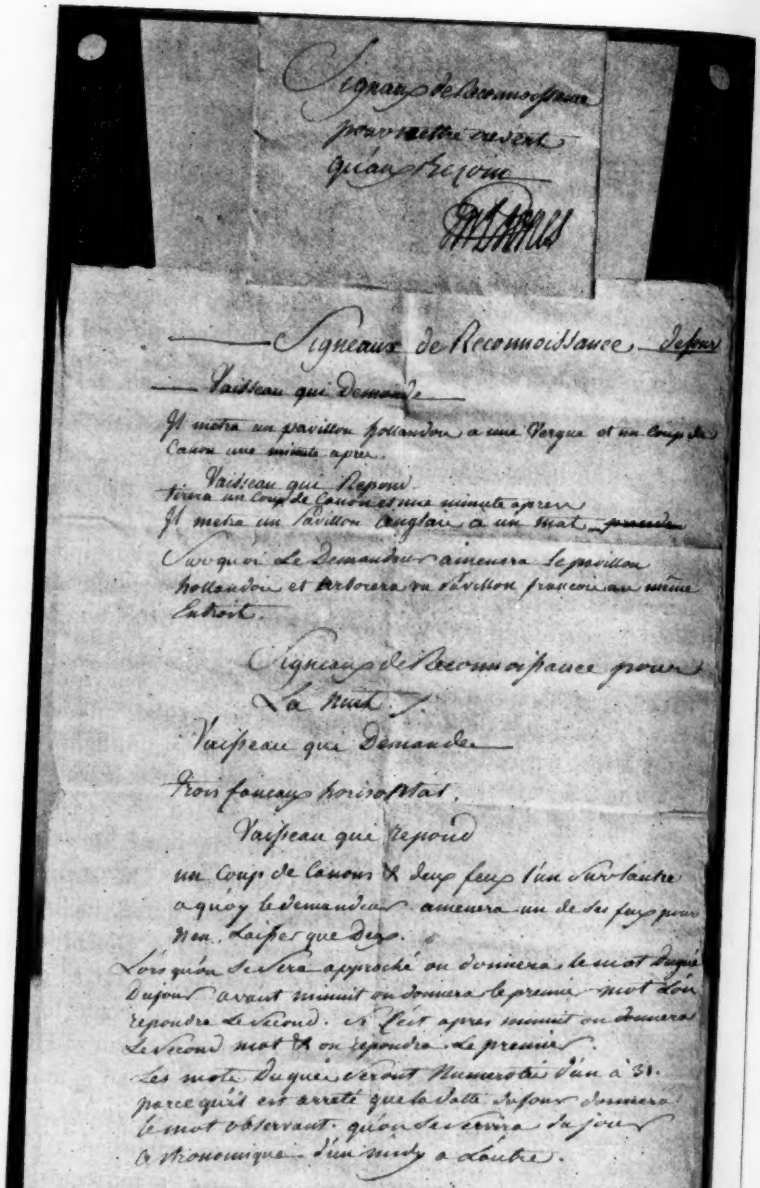
By Herman F. Krafft, Curator, U. S. Naval Academy

RUSKIN somewhere in his books urges his reader to gaze steadily at a black smudge on one of the walls of a church in Florence. If at the end of half an hour the gazer does not see a wonderful picture in the smudge, Ruskin suggests that he go back to his butcher shop in Chicago. Somewhat similarly, an oil painting, coated with a dozen years of dust fixed by a dozen coats of good navy spar varnish, was included in the Naval Academy collection of paintings. It looked like some navy "chromo," with a suggestion of masts and water, perhaps a storm at sea. After much patient work in removing varnish and dust, an artist found the canvas had originally been intended to represent *Old Ironsides* being warped to her dock at Constitution Wharf. The dark smudge turned out to be a bright sunny picture by Salmon, a noted marine artist, and presented by Mr. R. B. Forbes, a wealthy ship owner of Boston. It hangs today in the Administration Building of the Naval Academy, a fine work of art, valuable alike for its intrinsic beauty, the renown of the artist, and the generosity of the donor.

Half a century and more ago, the United States Navy had many such priceless articles distributed in small museums, called lyceums or naval institutes, in our navy yards. The first and most important of these, called the United States Naval Lyceum at the then Brooklyn Yard, was begun shortly after the British Royal United Service Institute, under the patronage of William IV of England, "the Sailor King," was founded in London. A portrait and a marble bust of William IV were presented by the British to the Brooklyn Naval Lyceum soon after the latter's foundation in 1834. In the course of years the fine collections of the Brooklyn Lyceum became dust-covered and neglected; the older officers, who had brought together from the ends of the earth articles associated with their cruises and careers, had died, and the survivors in 1889 presented the bulk of the collection to the Naval Academy.

Here in due course the objects were mounted, for the most part in cases in the new Memorial Hall, where they were for a time admired and revered. But it requires constant attention, to say nothing of money, to keep such old things from deteriorating, to replace dingy labels, to preserve the articles against rust, dirt, moths, and in general to prevent them from looking like the typical piles of junk that old museums often resemble. In the course of time the cases in Memorial Hall assumed such an appearance; children played with ancient ship models and swords of Revolutionary heroes, and midshipmen slipped into the cases their cast-off pipes or caps under such labels as "Tobacco pipe of the Indians from the North West Coast," or "Service Cap worn by Farragut." If historic objects are not cared for so that they continue to elicit interest and reverence for the past, they are likely to degenerate into a joke, a commonplace, lacking vital appeal to the living present, as dead as the Egyptian mummies that were once exhibited in the old Naval Academy Lyceum. The superintendent at the time, feeling no doubt that for the midshipmen familiarity with the objects in Memorial Hall was breeding anything but reverence, ordered what was left of the Brooklyn Lyceum collection to be once more boxed up and stowed away.

In 1912 Congress appropriated $30,000 to repair and mount the naval trophy flags in air-tight cases, and during the following decade the Brooklyn and other collections were again brought out for exhibition. In 1921 the fine collection of the Boston Naval Library and Institute, after vicissitudes that paralleled the Brooklyn Lyceum's history, was generously presented by the surviving members of this organization to the Naval Academy. The superintendent had appointed in 1919 a curator whose duties included the care and tabulation of all historic material. The Boston and earlier collections were gradually cleaned, identified as far as possible, catalogued, and placed on display in what has come to be known as the Naval Academy Museum, located in Maury Hall. In 1924 by the generosity of Mr. Edward J. Berwind, an alumnus of the Naval Academy of the class of 1869, the *Catalogue of Historic Objects at the U. S. Naval Academy* was published. This catalogue not only contains information of use to museums, libraries, feature writers, and so forth, but it puts the record of the articles in permanent and indestructible form. In the past the



Signaux de Reconnoissance pour reconnoitre ce vert Jean Bart

Signeaux de Reconnoissance Jersey

Vaisseau qui Demande

Il mettra un pavillon hollandois a une Vergue et un Coup de Canon une minute apres.

Vaisseau qui Repond

Tirera un Coup de Canon et une minute apres

Il mettra un Pavillon Anglois a un mat

Auquel le Demandeur amenera le pavillon hollandois et arborera un pavillon francois au même endroit.

Signeaux de Reconnoissance pour la Nuit.

Vaisseau qui Demande

Trois fanaux horizontal.

Vaisseau qui Repond

un Coup de Canon & deux feux l'un sur l'autre

auquel le demandeur amenera un de ses feux pour Non. Laissez que deux.

Lorsqu'on sera approché on donnera le mot Depuis le jour avant minuit on donnera le premier mot pour repondre le second. et l'est apres minuit on donnera le second mot & on repondra le premier.

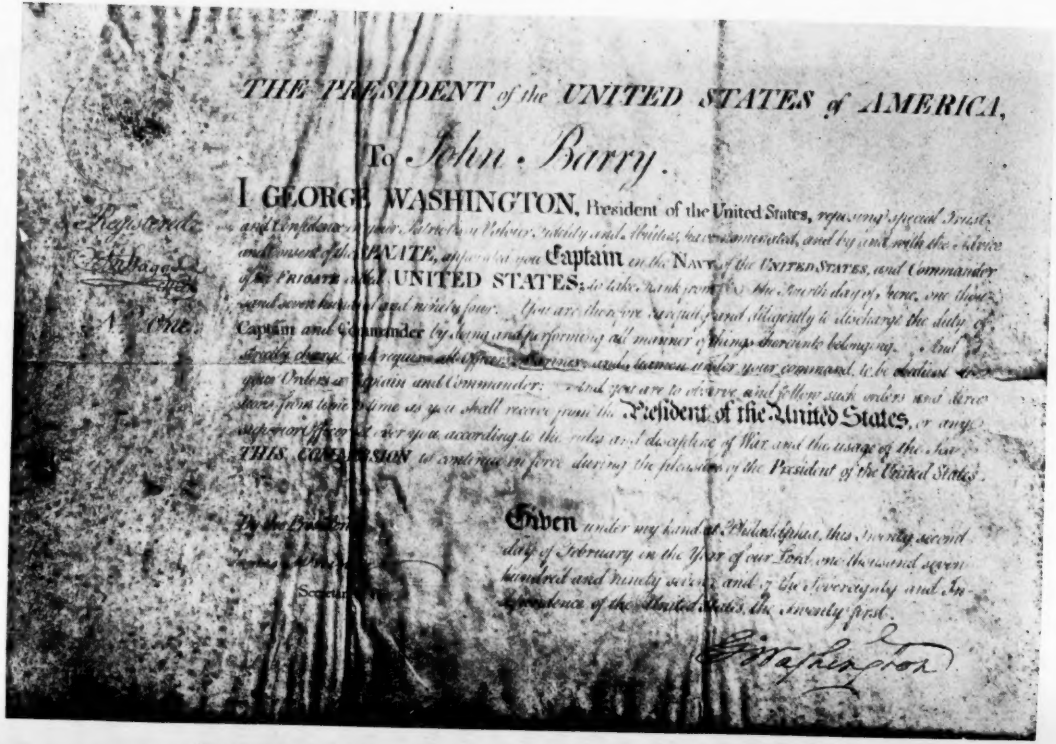
Les mots de ces deux seront Numerotés d'un à 31. parce qu'il est arrêté que le dit Jour donnera le mot observant qu'on les donnera du jour de Chronologique d'un minuit a l'autre.

DAY AND NIGHT RECOGNITION SIGNALS OF JOHN PAUL JONES
Original presented by the novelist, Dr. S. Weir Mitchell

records have often gone astray from their objects or have been entirely lost, so that some such articles, which with their records would be priceless, are today of little or no value.

From time to time many other valuable gifts, such as the fine Washingtonia presented by R. T. Crane, Jr., of Chicago, the two-score trophy flags of Manila Bay presented by Admiral Dewey, the sword of Rear Admiral John L. Worden presented by his son, and many donations by widows and relatives of officers of the Navy, have been added to our collections. Owing to lack of space and money, and to the decision of the Secretary of the Navy that a Naval Academy museum should concentrate primarily on objects associated with the history and traditions of the Navy, many natural history articles like sea shells, stuffed fish and birds, ethnological material from barbaric races, and historic relics not connected with the Navy or even the sea, were given by the Secretary of the Navy to universities and libraries, or were, at the instance of Senator Lodge, returned to Massachusetts institutions.

Of course, sometimes gifts that are of little or no interest have of necessity been accepted. Such gifts entail for the government a care and expense out of all proportion to their value. For instance, a tinted print of the *Constitution-Guerriere* fight was marked in the old records "Painting given by ————————, August 1, 1849." After the removal of many coats of varnish and dirt, the "painting" (which was at this late date so shot to pieces that it looked as if it had itself been in the battle)—this "painting" turned out to be a lithograph. Other gifts have been mere advertisements, for example, displaying a United States battleship or squadron, to urge you to insure your life even as the Navy insures the nation's life. Sometimes donors, accompanied by photographers and reporters and with much speech making and ceremony, present articles of comparatively small naval interest, but as a superintendent of the Naval Academy remarked, apropos of such a gift, "We must look at the spirit of the gift." It is sometimes small wonder that superintendents of the Naval Academy have grown impatient with the dingy and dust covered pictures thus wished upon them, which used to decorate the walls of the old Naval Academy. One such superintendent ordered a lot of "junk" to be thrown away or given away. Incidentally, he got rid of some rare manuscripts, prints, water colors, and oil paintings.



THE PRESIDENT of the UNITED STATES of AMERICA,

To John Barry.

I GEORGE WASHINGTON, President of the United States, reposing special Trust and Confidence in your Patriotism, Valour, Conduct and Abilities, have nominated, and by and with the Advice and Consent of the SENATE, appointed you Captain in the Navy of the UNITED STATES, and Commander of the FRIGATE called UNITED STATES: to take Rank from the fourth day of March, one thousand seven hundred and ninety four. You are therefore carefully and diligently to discharge the duty of Captain and Commander by doing and performing all manner of things thereunto belonging. And I do strictly charge and require all Officers, Mariners, and others under your command, to be obedient to your Orders as Captain and Commander: And you are to observe and follow such orders and directions from time to time as you shall receive from the President of the United States, or any superior Officer set over you according to the rules and discipline of War and the usage of the Sea. THIS COMMISSION to continue in force during the pleasure of the President of the United States.

Given under my hand at Philadelphia, this twenty second day of February in the Year of our Lord one thousand seven hundred and ninety seven, and of the Sovereignty and Independence of the United States the twenty first.

Go: Washington

COMMISSION OF JOHN BARRY AS A CAPTAIN IN THE U. S. NAVY
Signed by George Washington on latter's last birthday as President, February 22, 1797

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While some of the Naval Academy collections are on display in the various buildings, especially the older trophy flags, which are in Mahan Hall, the bulk of the collections is concentrated in the five rooms of the Museum. These include: (1) The Curator's Office, which, besides articles connected with the older Naval Academy, contains small rare and valuable objects like gold medals, Congressional medals awarded to the heroes of 1812, early holograph letters, and other manuscripts. (2) The Old Navy Room, except for a few cases devoted to the Spanish War, contains relics, ship models, swords of officers, and prints of the days of wood and sail. (3) The Ethnological and Merchant Marine Room contains Polynesian, American Indian, and Chinese objects brought back by officers from punitive expeditions against pirates; articles associated with Perry's opening of Japan to trade and the clipper era, and with United States naval survey, scientific, polar exploration, and similar expeditions, and relics of memorable shipwrecks like the United States Mail S.S. *Central America* and the U.S.S. *Saginaw*. (4) The Civil War Room is intended to illustrate the sudden change during that war from solid shot to explosive shell and torpedo, from smooth-bore to large caliber naval rifle, and from sail and wood to steam and iron. Many of the articles in this room are from the old Bureau of Ordnance Museum of the Naval Gun Factory at the Navy Yard, Washington, D.C. (5) The World War Room has the mere beginnings of what ought to develop some day into a very large and unique collection. At present it contains such articles as German torpedoes and a flag from S.M.S. *Geier,* seized by the United States Navy at Honolulu upon our entry into war; brass stars and chevrons worn by the U.S.S. *Fanning* for her capture of the *U-58;* a periscope from the German *UC-97;* German machine gun captured at Belleau Wood by the United States Marines; a mine of the type used in the North Sea barrage; a *Y*-gun and its depth charges; United States and French ensigns from the American Naval Headquarters at Brest; French and American war posters, including the original of the poster, "Gee, I wish I were a Man!" given by the artist to the U.S.S. *Texas* and by the *Texas* to the Naval Academy.

With the more prominent of the 2,500 historic articles, scattered around in the Museum and other Naval Academy buildings, officers are familiar. Midshipmen in the old days were brought up on Perry's Don't-Give-up-the-Ship flag, the marble tablet,

COMMISSION OF JOHN BARRY AS A CAPTAIN IN THE U. S. NAVY
Signed by George Washington on latter's last birthday as President, February 22, 1797

sextant, and gig of the *Saginaw,* the Tecumseh figure-head of the old *Delaware,* the British frigate *Macedonian's* lion and guns, and the heroic statue of Andrew Jackson from the bows of *Old Ironsides.* Those midshipmen who had an occasional heart-to-heart talk with the commandant in the old days may remember the four pictures of the *Constitution-Guerriere* fight that adorned his office and that have recently been much reproduced, for instance in the October number of this magazine. Some officers can even recall in the Boston Yard the *Constitution's* billet-head, also her sea anchor used by Hull in the memorable chase, and the beautiful little bone model of a French ship of the line, made in a British prison during the French Revolution, which was presented by Captain Samuel Knox, U. S. Navy, in the seventies and which in these days of quest of real antiques is probably worth much more than its weight in gold. But many articles with which officers are perhaps not so familiar have been presented in more recent years. The Naval Academy's "Constitutiana" has been recently augmented by a bit of her *Guerriere* battleflag, presented by Mr. George L. Upshur, a cribbage board from her timbers, presented by Congressman James M. Magee, and Isaac Hull's snuff box, the gift of Rear Admiral E. H. C. Leutze. A small bust of Lord Nelson, made from copper of his flagship, the *Victory,* was presented on the hundredth anniversary of the Battle of Trafalgar, in 1905, by the British to the United States Navy and is now in the Naval Academy Museum. With the collections of the Boston Naval Library and Institute and the Brooklyn Naval Lyceum came many holograph letters of the earliest officers of the Navy, and also the letter book of Robert Morris, the Revolutionary agent of marine, or first Secretary of the Navy. As a sample of one of these old letters we might take the one written by O. H. Perry to Captain John Downes, March 22, 1816, in which he makes the following request: "Will you have the goodness, in addition to the articles I asked you to procure, to purchase 7 or 8 doz. claret, some olives, and the musical instruments mentioned in the enclosed memo." In the Brooklyn collection Mr. James C. Brevoort presented the letter book of John Paul Jones, which contains copies of his correspondence during his epochal cruises in the *Ranger* and the *Bon Homme Richard.* Among these copies is not only one of Jones's much quoted letter to the Countess of Selkirk but another loose copy of the same letter with fewer errors and blots. It will be recalled that Jones had sent his men ashore to seize the Earl of

Selkirk so that the Colonies might have an important hostage for the better treatment of American prisoners. Not finding the Earl at home, the sailors ran away with his silverware. To apologize for this unlawful seizure, Jones with much flowery language and some poetry wrote the above letter. In his desire to make a very careful job of it, he not only had the letter copied in the book but made two originals to make sure of a fair copy for his noble correspondent. In this connection, we may also mention the very generous gift of Rear Admiral R. F. Nicholson, who last year gave the Academy John Paul Jones's service sword, which after his Revolutionary career Jones had presented to Theodosia Burr, daughter of Aaron Burr. Last year also the sword of the first superintendent of the Naval Academy, Captain Franklin Buchanan, was added to our collection of small arms. This regulation United States Navy sword, worn by Buchanan during his service in the Confederate Navy, was surrendered by him to Farragut after the Battle of Mobile Bay, was inherited by Farragut's son, who later gave it to Buchanan's widow, by whose nephew, Ensign Franklin Buchanan Sullivan, it was presented to the Academy.

So much for the Naval Academy Museum and its collections. But the Navy must build up a museum worthy of its great traditions; a museum that will compare favorably with the greatest naval museums in the world. To do this is it well to scatter small collections throughout the various yards, as was once done, where they may again fall into the almost inevitable neglect with its consequent irreparable losses of priceless relics? An aide in one yard informed the writer that the hustle and bustle of the war coming on had relegated a once fine museum collection to a warehouse where he had found the articles broken and scattered over the floor. What was left he had packed in boxes. Despite this aide's care, the records of the oldest and most valuable objects in this collection seem to be lost. To locate any specific article in the boxes or to assemble the broken parts of others is now a task like hunting for a needle in a haystack. Before more irretrievable losses of trophies of the Navy occur, would it not be better to gather them all together under one roof? In some such way the thousands of historic objects will help to complete a great mosaic which will picture in striking fashion the whole splendid story of the Navy from 1775 to 1918. If the Navy wants such a museum, could it be better located than at the Naval Academy, where the leaders in the making of the traditions of tomorrow are reared?

LAW AND WAR

By Captain Elbridge Colby, Inf., U. S. Army

WE HEAR from time to time expressions of a wish to abolish war by establishing the rule of law. Why, it is said, if differences between individuals are settled by judicial process, should not differences between states also be settled by judicial process? Law is the antithesis of force, it is said. If law reigned, there would be no war. This line of argument consists of three steps or points, logical enough in sequence; but each of the steps presumes a fact that is not true.

The first point made is that differences between states can be settled in the same manner as differences between individuals. But, as a matter of fact, they cannot be so settled. It is perfectly true that arbitrations have been held, and that arbitral arrangements do exist for the settlement of some types of international disputes. Yet arbitrations are not compulsory. Neither the Permanent Court of Arbitration at The Hague nor the World Court of International Justice has the power to compel appearance, as a local judge does by issuing a writ or as a county sheriff by serving a warrant can bring individuals before the bar of justice. Individuals are subject to laws, but nations are sovereign. Individuals are subject to authority, but nations make their own authority. An individual's independence of action is limited by superior governmental power, but nations are jealous of their independence of superior power. *Still,* attempts have been made to draw larger analogies than these. It has been said that the nations of the world could settle their disputes and live peacefully together the same as do the separate sovereign states of North America within our federal union. People have pointed to the large number of judicial decisions handed down by the Supreme Court of the United States which have settled disputes between Rhode Island and Massachusetts (12 Peters 657), between Louisiana and Mississippi (202 U. S. 1), and between many other states, and also between the states themselves and agents of the federal govern-

ment in Washington. (*Missouri v. Holland,* 252 U. S. 416; *Tennessee v. Davis,* 100 U. S. 257). And yet the people who point these things out have overlooked the fact that these states submitted their differences to the Supreme Court. Having subscribed to the Federal Constitution they were compelled, or could have been compelled, to submit their disputes to that court. The Constitution and the Supreme Court and Congress may have preserved the federal union. The power of the government in Washington may have been recognized, but it is recognized in all our states only because it has shown itself able and inclined—when necessity demands—to exert its power by force of arms. When a state disagrees with another state or with the government in Washington, it submits its case to the courts for it has learned that the federal government in Washington is capable of enforcing its will. New England once had her thoughts of secession as well as South Carolina. Do the words "Shay's Rebellion" or "The Whiskey Rebellion" mean anything in the history of our country? Sometimes the federal courts function because separate states or the separate communities accept their jurisdiction. But sometimes the federal power has had to be forcibly invoked, and the idea and principle of our union and the force of our federal laws have had to be powerfully impressed upon recalcitrant elements. And so, whether we speak of the individuals or whether we speak of the states which make up the United States, we still find there is no real similarity to the states of the world. The first point made by those who would substitute law for war is argued by analogies which are not true.

The second point made is that law is the antithesis of force. So it may seem at first glance, suppressing the corner brawl and the breaking and entering of midnight burglary. But does not a policeman carry a club and a revolver? Does not the state provide its jails and the government its penitentiaries with stone walls, iron bars, and bolted doors? Law is an idea. It is a principle. It is a rule of action. To make it effective there must be enforcement. To apply it, there must be the use of force, or the threat of force. A President of the United States exemplified the weakness of merely judicial processes when he remarked: "Chief Justice Marshall had made his decision. Now let him enforce it." On another occasion, Andrew Jackson was ready to back up the law of the Constitution by the armed forces of the country. His statue

stands in Washington in front of the White House. On its pedestal is inscribed his most famous declaration: "Our Federal Union, it must be preserved!" And it is not by chance that the sculptor has represented him in the uniform of a general, and that the statue and pedestal are surrounded by cannon, the implements of war. Decades later, when Abraham Lincoln struggled for the maintenance of the Union, he employed the land and naval forces of the United States. From 1861 to 1865, as General Sherman pointed out in 1876 to General Meigs, "the Supreme Court was absolutely paralyzed; their writs and decrees were treated with contempt south of the Potomac and Ohio; they could not summon a witness or send a deputy marshal. War, and the armed power of the nation, alone removed the barrier and restored the United States courts their lawful jurisdiction." As Admiral Rodgers well pointed out at Williamstown in August, 1923, law is not the antithesis of force at all. Law depends upon force. He said:

> Law does not prevail by moral force against those who for many reasons are determined to resist it. Popular language often embodies a conception of the public more truly than the formal precision of scholars and professional men, and every day we are reading in the papers of the "war upon the bootleggers!" The law has drawn its sword from its scabbard and is swinging it against the forces of disorder, or rather, in more modern parlance, it has "pulled its gun," and there is bloodshed.

When a local disturbance gets beyond the power of a state governor, he may—under certain restrictions—call upon the President for troops to maintain peace and order. An alleged wrongdoer may come freely before the magistrate to defend and clear himself. Yet, usually, the police officers have to seize a murderer or a burglar and compel him to submit his will to judgment in accordance with the general ideas, principles, and rules of action which the people of the country have enacted into law. The will of the people rests only upon the power of the people's agents. The rule of the people rests only upon power over the people. Law is not the antithesis of force. It may direct the use of force, but it does not disregard force altogether. A judicial process is the forceful application of an idea, principle, or rule approved by the people against an opposing force and a contrary principle. The second point made by those who would substitute law for war fails likewise to have any weight or truth.

The third point made is that if law reigned in international affairs, there would be no international war. That is to say if all ideas, principles, and rules of action were universally accepted in international relations there would be no war. Yet, states are ambitious. States are covetous. States are desirous of defending themselves from aggression or insult. Their ideas, principles, and rules of action are not uniform. In order to have international law supplant international war, all states must submit to a common rule. All states must be willing to forego their independence of action, and to sign away their separate sovereignties. All states must be willing to submit to judicial settlement of all disputes. And that is just what they are now unwilling to do. There have been many thousands of arbitrations in the world, and only a mere handful of arbitral decisions not accepted by the parties thereto. The difficulty has not been to enforce decisions, but to compel the states to come to the arbitral table in the first case, to compel them to abandon that independence of action of which all patriotic states are jealous. This is a difficulty which must be apparent to every reader of the newspapers of the last five years. The principal American objection to joining the League of Nations has been founded on the fear that we might be compromising our independent isolation and entangling ourselves with European responsibilities. The principal popular objection against our subscribing to the World Court was founded on the fear that we might have to submit our actions to a jurisdiction superior to the will of our own government. If the nations of the world should all submit to such a general and superior jurisdiction, there would be an effective international law. But it would be effective only because it would be enforceable. It might be said that international war had ceased to exist and that international law had taken its place. But if international law disappeared it would have disappeared only because nations had disappeared, as separate sovereign entities. We would not have states. We should have only a single world state. And that world state would only be enabled to continue to exist as a unified organization, because it would have the power of enforcing its executive decrees and judicial decisions. There would probably be attempts at secession from the world state just as there were attempts to secede from the United States. There would probably be a world civil war, to settle for once and all the doctrine of "state sovereignty." And even if there were no such

world civil war to maintain the supreme world power, that world power would be supreme only because it had the force necessary to repress risings against it. There would be little or no change, in reality. Merely a change in phrase. It makes no difference whether you would call a conflict of the future a civil war or an international war, it would be a war just the same. It makes no difference whether you would call the power that would rule the world "dominating diplomacy," or whether you would call it the "rule of law." Force would be the substantial and powerful arm of enforcement, just as it is today. Administrative and executive departments are necessary. Laws do not enforce themselves. And administrative and executive departments function by the strength of the governments under which they function. This is what the late President Wilson meant when he said that the removal of Article X from the Covenant of the League of Nations would take the teeth out of that organization and render it useless and ineffective. And so the third point of our opponents likewise fails of proof.

In order to secure the rule of law internationally, then, we must have the use of force, force exerted by a single nation willing to fight for the rights of neutrals, as was the United States in 1917, force exerted by a group of nations willing to fight for international honesty and scraps of paper solemnly agreed upon, or force exerted by a world-wide organization of nations bound together into a single body. International law is not a set of rules universally accepted. Some of its doctrines are accepted by some nations; some by others. By the Declaration of Paris in 1856, certain nations banned privateering in time of war; and in 1898, the United States reserved the right to use privateers—even though not using them. A treaty of 1919 concerning the Aaland Islands is the broadest acceptance of the doctrine of the three-mile limit; and yet France, and Spain, and Scandinavia would prefer to protect themselves by six-, nine-, and twelve-mile strips of territorial waters. And Great Britain and the United States have agreed, for certain purposes only, to "an hour's steam from shore" and announce that three miles is the standard limit. International law is influenced by, and is dependent upon, municipal enforcement. International law is not the law of all nations, but only of those nations that accept it. Each nation believes in and enforces and stands by its own conceptions of international law.

"International law," says Professor Reeves, "is merely a body of rules and customs that have grown up among nations more or less similar for use among themselves." It is understood that international rules for the conduct of warfare are applicable only between those nations that have subscribed to those rules. Between those nations and nonsignatory nations, persuasion, force, and reprisals are the only means of securing the supremacy of the rule. These rules, says the British *Manual of Military Law* with reference to the rules of land warfare, are applicable only in conflicts with civilized states. Against uncivilized people, the *Manual* adds, they are supplanted by such regulations as the commander in the field may think appropriate in the particular circumstances of the campaign. This is something we too frequently forget when we hear of international law. We forget the nonsignatory states, the unenlightened peoples, and the uncivilized nations. It has been pointed out that there are sixteen hundred million people on this earth, that a thousand millions of them are not far from the savage state, and that five hundred millions are ready to fight for what they want if they think they can win the fight. We, of the United States, are only a hundred million strong. And that makes the total. Even supposing that the six hundred millions believed in international law as a rule of state action, supposing they should abolish war between themselves, supposing they should scrap their armies and navies, and supposing them sufficiently civilized to abolish the use of force—supposing all of these things, what of the other billion people on this earth not far from the savage state? Read the words of Professor Reeves:

> International law is not applicable to uncivilized people and could have no influence upon them. . . . . Most wars are caused by political differences, and international law is legal and cannot prevent political clashes. The influence of international law toward an orderly and peaceful world is of the greatest importance, but to expect of it the settlement of all the political, racial, economic, religious, and other differences and thus avoid war, is not only ridiculous but is utterly unfair and misleading. International law is based on the experience of more or less similar people and its influence, although naturally pacific, is not preventive of disputes beyond its realm. (Williamstown Address)

The limitations of international law are not generally taken into consideration by those who wish it to supplant war. Its limitations are really three in number. In the first place, it does not apply to the uncivilized races. In the second place, it does not even apply

to all civilized nations. In the third place, it does not apply fully even to those civilized nations who recognize it. Arbitration is a splendid thing, but it is much overrated. The arbitration treaties for which the United States receives much credit, for example, have a very limited value. They provide for arbitration to settle "differences which may arise of a legal nature, or relating to the interpretation of treaties," and always " provided that they do not affect the vital interests, the independence, or the honor of the two contracting states, and do not concern the interests of third parties." Indeed, it might almost be said without fear of contradiction that they deal only with things that have never led to war. Some of these things, in a few isolated instances, may have seemed to lead to war; but they were always merely the pretexts of war. The real causes of war are those very "vital interests" and that very "independence" and that very national "honor" which the arbitration treaties except from judgment.

The nations of the world are national states. They are warlike states. It is madness to believe that we now live in a peaceful world. It is all right to dream of a warless world, to hope for it, and to work for it. World peace will only be brought about by widespread education to higher ideals and by the passing of time. World peace will only be brought about by a world organization capable of enforcing its will upon rebellious nations. In the meanwhile we find an Englishman saying:

> England lies in the center of the world's land masses and therefore focuses their trade. London is the fulcrum of the world's money market. Yet we must remember that we neither towed England into its present latitude and longitude nor did we throw stones into the sea until it emerged. No, "Britain *at Heaven's command* arose from out the azure main," and was given not only a charter, but a population, who have come, therefore, to regard themselves as God's Englishmen, so well looked after by Providence that there is no need for them to worry about anything whatsoever, since we too are a Chosen People. (F. J. Adkins, *Historical Backgrounds*, p. 245)

In the meanwhile we see a great empire sending its traders and settling its people to all the corners of the seven seas, and protecting them with a mighty fleet and with efficient military garrisons, until their battle flags form a continuous link about the earth upon which the sun never sets. In the meanwhile, on the other hand, we see China, heedless of proper armed preparedness, careless of advances in methods of warfare, inefficient in armed organiza-

tion—China a prey to bandits and revolution within and a victim to despoilers and aggressors from without.

This is the state of the world today. The civilized law of the world is maintained by the use of force. There is a country constable at the crossroads. There is a county sheriff in the village. There is a police force in the town and city. The civilized white race maintains its supremacy by force of arms. The Indians belong to a subject nation, conquered by the westward moving forces of a federal government. The standards of conduct of the brown, and yellow, and black races are not those of the white. The standards of peoples and of nations are not the same. We believe in prohibiting the manufacture and use of intoxicating liquors, and need armed revenue agents to make our prohibitions even partially effective. We believe in American ideals and institutions, and erect barriers against the too rapid entry of immigrants from foreign countries into our land. The civilized states of the world believe in civilization, in civilized modes of action, ways of thinking, and in international law. And the civilized states of the world must be prepared to uphold that civilization and that law. For this, potential and effective force is necessary.

COMMODORE

By L. H. Bolander

TO THE student of the history of our Navy, the term "Commodore" is most familiar and carries with it associations of heroic deeds, and stirring scenes bound to thrill the heart of the American patriot. Such men as Perry, Preble, Decatur, and Macdonough, to whom the title has been attached, have given distinction to it, and have added glory to the nation's arms.

The first man to whom the term was applied in the American Navy, as distinct from the navy of colonial times, was Esek Hopkins, a brigadier-general of Rhode Island militia, and brother of the governor of Rhode Island. On December 22, 1775 the Continental Congress granted him the commission of "Commander-in-chief of the American Navy," and placed him in charge of a squadron of four ships already purchased by the naval committee. In nearly all accounts of this officer, he is mentioned formally as Commodore Hopkins, though he was addressed officially by Washington as admiral. His rank in the Navy was intended to be equal to that of Washington in the Army.

When, in 1779, John Paul Jones was cruising in European waters with five ships under his command he was known as Commodore Jones, although the highest commission ever held by him in the American Navy was that of captain, conferred on him on October 10, 1776. This would seem to indicate that "Commodore" was merely a courtesy title, and applied only to the senior officer of a squadron, even though his actual rank might be below that of captain. Commodore Perry and Commodore Macdonough had not been promoted to the captaincy when the one conquered at Erie, and the other at Champlain. But when afterwards promoted, Perry's commission was dated September 10, 1813, and Macdonough's September 11, 1814—the dates of their victories.

The first official recognition of the title to be discovered appears in the famous "Navy Regulations" issued by the Board of Navy Commissioners in 1818. The regulations provide that "Com-

missioned officers of the Navy of the United States are divided into the following ranks and denominations: Commodores, commanding squadrons; Captains, commanding frigates and vessels of twenty guns; Masters commandant, commanding sloops, and Lieutenants." The regulations further provide that a commodore shall have rank equivalent to a brigadier-general in the Army.

This ruling of the Commissioners evidently led to considerable controversy in the service, and probably caused some embarrassment to the Navy Department, for in the "Rules of the Navy Department regulating the civil administration of the Navy of the United States," published in 1832, we find a ruling of the Secretary dated February 1, 1822, concerning the rank of "Commodore": "This title cannot be recognized by the Department until established by law."

That the Secretary saw the need for higher rank in the service there can be no doubt. For, on December 2, 1822, President Monroe transmitted to Congress a plan devised by Secretary of the Navy Smith Thompson "For the peace establishment of the Navy, and of the Marine Corps." Among other provisions this plan provided for two grades above that of Captain—to be known as "Commodore" and "Rear-Admiral." "These grades," wrote Secretary Thompson, "are considered . . . . of very great importance for the due subordination and discipline of the service." Congress, however, did not see fit to create these grades, and the rank of captain continued to be the highest rank in the United States Navy.

Again on January 30, 1824, President Monroe transmitted to Congress a plan prepared by Secretary Samuel L. Southard for reorganizing the naval establishment. Among other measures he urged the creation of three grades above the rank of captain as follows: Vice Admiral, Rear Admiral, and Commodore.

Secretary Southard argued strongly in his report the vital necessity of these grades. He stated that it was difficult for the commander of a squadron to enforce discipline unless he held higher rank than the individual commanders of the vessels of his fleet. He stressed the fact that strenuous effort would be made to acquire the professional knowledge necessary for positions in these higher grades, thus resulting in a more highly trained personnel, and in the general good of the service.

Congress, however, ignored his advice, and it was not until the Civil War period that it saw fit to create a grade above that of

captain in the service. On July 16, 1862, nine grades of line officers in the Navy were established, and provision made in the measure for eighteen commodores. The bill provided that a "Commodore" might command a squadron, be chief of staff of a naval force commanded by an admiral, rear admiral, or vice admiral, or he might command a ship of the first class or a naval station. His rank was to correspond with that of brigadier-general in the Army.

On July 25, 1866, Congress raised the number of commodores from eighteen to twenty-five, but on August 5, 1882, reduced the number to ten. Their status was thus maintained for nearly seventeen years. By the Navy Personnel Act of March 3, 1899, the grade of commodore was omitted from the active list, and the ten commodores then on the list were promoted to rear admirals. This act, while abolishing the grade of commodore on the active list, did not affect the rank of officers then on the retired list having the rank of commodore, and contained several provisions for the future retirement of officers with that rank under certain prescribed conditions.

DISCUSSION

Sea Power and Pocket Books

(See page 2231, December, 1925, PROCEEDINGS)

CAPTAIN ELLIOTT SNOW (CC), U. S. NAVY.—*Sea Power and Pocket Books* by Captain Dudley W. Knox, seems to point the way toward the ultimate appearance of another epoch making book on the order of Captain Mahan's *Influence of Sea Power on History*, along side of which it may well have place. But for the fact that the article here discussed deals with more than one subject, it might well have been called the "Influence of Sea Power on Industry." It is, however, coupled up closely with a second which embraces the thought of "The Influence of Public Opinion on Sea Power."

Let us hope, the ready pen and the industrious habits of Captain Knox will lead him soon to tell, in his own convincing and simple style, in book form, the whole story of "The Influence of Sea Power on Industry." He might well commence with the days of Sidon and Tyre, reaching soon the day when the "Corn Grinders" of Rome lived *in daily fear for years,* of being thrown out of employment—the populace, of being without bread, through a possible disruption of the line of communication maintained by the corn fleet of Rome. It is recorded that an Egyptian corn ship like the *Goddess Isis* (Circa 120 A.D.) arrived, discharged and departed every daylight hour in Imperial Rome.

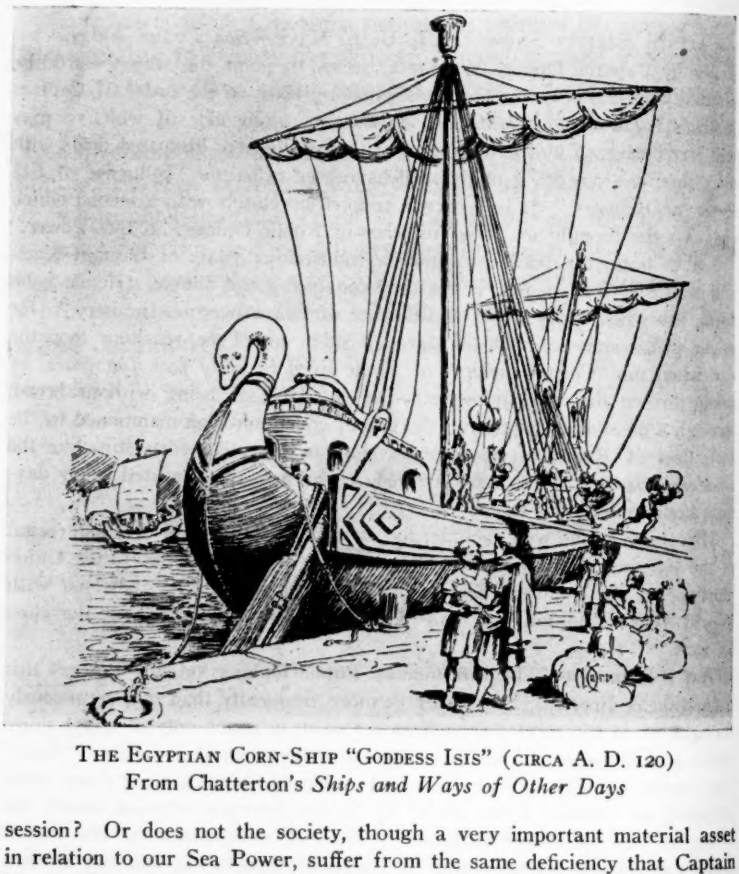
His story might well include, too, a circumstantial and detailed recital of the starving families of the cotton spinners of England, due to the Union blockade of the Southern States, 1860-65. Completing his study, *not* with World War Conditions of 1914-18, but with those obtaining at the close of 1925.

But it is toward "The Influence of Public Opinion on Sea Power" this discussion is directed. Sea power is, more frequently than not, erroneously thought of, in the service as well as out of it, in terms only of naval ships, bases, and the personnel which controls and directs these activities. "American owned (produced, controlled, and operated) shipping (not alone ocean shipping as Captain Knox limits it) is the keystone without which the structure of Sea Power will fall." The full development of our inland waterway transportation, as well as oversea transportation, will play its own peculiar part on elevating our sea power to its proper height.

When will our great railway operators awaken to the fact that, in our foreign and domestic transportation problems, their prosperity in peace, and ultimate safety from possible bankruptcy in time of war, are linked up inextricably with the sea power of the United States! When will they perceive that increase in inland water transportations, *fed as it ever must*

be by those very railways, means an increase in passenger fares and freight receipts! There are many situations in which the prosperity and welfare of the people of the United States will be subserved better by closely interlocking the operation of railroads on land and vessels on the water.

A very important paper on this subject was presented at the last meeting of the Society of Naval Architects and Marine Engineers (November, 1925). The discussion of this paper was disappointingly meager. Why was this so? May not the cause have been the small attendance at that particular



THE EGYPTIAN CORN-SHIP "GODDESS ISIS" (CIRCA A. D. 120)
From Chatterton's *Ships and Ways of Other Days*

session? Or does not the society, though a very important material asset in relation to our Sea Power, suffer from the same deficiency that Captain Knox points out with regard to the Navy—*lack of* participating actively—aggressively—in proper publicity. "The propriety of naval officers participating in proper publicity" and their duty so to do, is, according to Captain Knox beyond question. Many naval officers are members of great societies whose relations to our seapower are intimate and are, therefore, in a position to speak with telling effect.

All writers, or rather publicists, do not possess the balanced judgment and moderate phraseology of Captain Knox. We have seen more than once unjust criticism leveled at the Navy due to ill-advised forms of publicity. The question naturally therefore presents itself "Who individually or what group of persons is to decide on *what constitutes proper publicity?*" A correct answer seems to phrase itself somewhat thus. "They who are not actuated by animus against their neighbor and who are very mindful of possible beams in their own eyes."

Vainglorіousness, hypocrisy, and harping criticism represent attitudes of mind that are always a menace, as much (if not more), to the attainment of sea power in the United States as in other national endeavors. They engender the advocacy of false doctrine in many, who, if they had been given the facts in a whole souled and simple way, and not left like children to gain their impressions "away from home," would have been strong wise advocates of sea power.

We need entertain no misgivings in respect to the writings of the author of *Sea Power and Pocket Books.* What he has now written, and whatsoever words were written aforetime by others in like spirit, were written for our learning. Read, mark, learn, and inwardly digest.

The War Staff Idea Afloat

(See page 2298, December, 1925, PROCEEDINGS)

LIEUTENANT COMMANDER F. S. CRAVEN, U. S. NAVY.—In his article on the "War Staff Idea Afloat," Lieutenant H. J. Wright presents an important subject which deserves general Service consideration. It is hoped that his article will receive extensive discussion.

I shall presume to enlarge somewhat upon three points in Lieutenant Wright's article which to me seem especially important. These are as follows:

Service repugnance to the idea of a general staff. Lieutenant Wright shows that logically this repugnance should not exist. I have come to believe that some officers refrain from advocating a general staff because they think Congress would be hostile to it. At least, I have heard that idea expressed several times. Congressional antipathy is subject to determination by actual test, and although I admit ignorance of Congressional methods and motives, I fail to see how an attempt to secure a general staff organization for the Navy could bring upon us any greater misfortune than failure to get it.

The advantage which the Army has derived from the general staff should be a powerful argument for extending it to the Navy. It is equally applicable to both services, as Lieutenant Wright shows.

All officers are not mentally and temperamentally fitted for war staff work. It appears to be the unwritten personnel policy of the Navy Department that all line officers should be "generalists," able to undertake any kind of duty which comes within the province of the line. For instance, all line

officers are expected to be operative engineers in the line, officers of ship propulsion, ordnance, radio, and general electricity, to be navigators, gunnery and communication officers, to be leaders of men, to be versed in military and international law, and to become strategists and tacticians. In the lower grades officers actually are allowed to specialize to a considerable extent, but when they are promoted they are examined in all subjects.

I am not trying here to amplify contentions which I have made elsewhere that this policy hampers proper and necessary specialization, but rather to point out that it is inconsistent with the fact that men are of different types. Some are fitted to be operatives—to execute. Others are fitted to be planners. Only a small proportion is fitted for both planning and executive work.

Our line officers consist of men of these three types in about normal proportions. It is true that they have survived a selective process, but this process has not discarded all except those fitted for both planning and execution. The personnel turnover incident to such drastic selection would be simply staggering.

But it is not conceivable either that we could or should attempt to discard all but this versatile type. In the first place, the reservoir of officer personnel available to the Navy is not large enough to provide a sufficient number of officers of only this type; nor could we hold this number if they could be found, because the salaries paid to naval officers would be inadequate to satisfy these men who would possess the capabilities from which our great industrial leaders are made. Those of this type which the Navy does hold, are held only by the fascination and interest of the life, not by their salaries or other material perquisites. In the second place, the Navy needs gifted planners for its highly technical work, and with a proper sort of specialization it need not require in these men an equal capacity as executives. Likewise it requires a large working body of operatives—a proportion of them much too great to offer any prospect that all of them could ultimately be received into the group of selected leaders who should comprise the top grades. Therefore, all operatives need also be gifted planners.

Lieutenant Wright has shown that for our war staff officers we require those by nature specially equipped for general functions—that is, for both planning and execution. These are also the qualifications for great naval leaders, just as they are for industrial and other leaders in the world's affairs. Then our war staff officers should be the natural reservoir from which to develop our higher commanders.

We should follow the Army's lead in providing a machinery of schools and active service tests whereby these men can be identified, selected and trained. The Navy can no longer afford to follow its faulty theory that all officers can do all classes of work with satisfactory efficiency. It has, in fact, followed this theory far too long.

The Navy should develop its war staff now, while it has time during peace, because in our next war we cannot expect to have an ally to hold off the enemy while we reorganize.

Because the Navy did well what it had to do in the World War, many infer that our present organization must be good. They fail to remember that we took no part in the vital naval activities of the war which gave the acid test of conflict to ships and tactical theories and administrative organizations. To those who study carefully these features of our Navy, both upon their own merits and with respect to similar aspects of great foreign navies, there are abundant and distressing indications that we need fundamental changes. Of these one of the most important is the development of the war staff.

Lieutenant Wright has pointed out the sad consequences likely to be incident upon failing to make this and other necessary changes *now*, in time.

In conclusion, it seems to me that Lieutenant Wright has shown clearly that the war staff idea is not separable from the general staff idea. In fine, what the Navy needs is a general staff organization.

From "The Engineer," January 1, 1926. *See page 516*

VICKERS "VANGUARD" 25-SEATER PASSENGER BIPLANE

PROFESSIONAL NOTES

PREPARED BY

LIEUTENANT COMMANDER H. W. UNDERWOOD, U. S. NAVY

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GREAT BRITAIN

The Navy in 1925

The Army Navy and Air Force Gazette, 2 January, 1926.—The outstanding feature of the history of the navy in 1925 was the authorization by the government of a further lowering of the standard of readiness of the fleet for active service. To tamper with the traditional standard, as the First Sea Lord said at the Guildhall banquet, is a grave step which can only be justified by the most serious exigencies. The Admiralty recognizes the needs of the moment, and therefore ecquiesces loyalty in the policy of the Cabinet. Among the fields of economy thus opened up have been the closing of the dockyards at Rosyth and Pembroke, the recall of a battle squadron from the Mediterranean for the training of boys in the Atlantic, the abolition of depot-ships for destroyers, the withdrawal of small craft attached to the training schools at the ports, and the earlier scrapping of the "R" class of destroyers.

In the realm of personnel, apart from a certain amount of discomfort created by these changes and reductions, the year has not been altogether successful. The inclusion of provision for a marriage allowance for naval officers in the Estimates in March, and the refusal of the government in August to concede this overdue reform, although the money had been voted by the House of Commons, created an unfortunate impression. In April, apparently under outside influence, the Admiralty lowered the relative status of Royal Marine officers. More recently, by the unexpected reclassification of naval officers, they have revived the old invidious distinctions between the engineers and other branches which had long since been abolished and almost forgotten. Less surprising, but no more popular, was the adoption in October of lower rates of pay for future entrants.

The continuance of the cruiser replacement program begun in 1924 by the Labor Ministry was the subject of a lively controversy in the spring, and eventually, after a committee under Lord Birkenhead had investigated the whole question, a five-year scheme of construction was agreed to, of a much more modest character than that formulated by Mr. Amery's board in 1923. In order to allow of the beginning of this scheme in 1925, the Admiralty had to pledge themselves to save over half a million from the current Estimates, and this they are now doing. In spite of an elaborate official analysis of the causes of increased expenditure on the civil side of the administration, the feeling prevailed that these inflated establishments, as compared with their strength in 1914, were not contributing their fair share of economy, and that they offered a fruitful but neglected field for retrenchment. The fleets at sea continued to maintain the high prestige of the navy, both in exercises and during visits to foreign ports. On his return from his African and South American tour in October, on board the *Repulse*, the Prince of Wales generously acknowledged that his task on these tours had been considerably lightened by the help of the navy. The unrest in China, which led to temporary reinforcements of the forces there, once more gave an opportunity for our seamen to demonstrate their worth in assisting to preserve order. The closing weeks of the year were shadowed by the distaster to *M-1*, in which Lieutenant-Commander Alec M. Carrie and sixty-eight officers and men lost their lives—the biggest loss in the history of British Submarine Service. There was some satisfaction in the subsequent revelation that a collision with a merchant ship caused the foundering of the vessel, and that she was not, as far as could be known, the victim of any inherent mechanical defect.

The Air Force in 1925

The Army, Navy and Air Force Gazette, 9 January, 1926.—The principal change concerning the Royal Air Force during the past year has been the

decision to slow down the development of the Home Defense scheme in order to satisfy the demand for economies. The decision, while regrettable, is nevertheless on sound lines, as it is the lesser of two evils, and infinitely better than scrapping and reducing. The chance of any raid upon our coast or towns is what may be termed a "future," and little will therefore be lost in spreading over a longer period the completion of the plans for home air defense.

Much of the best work of the Royal Air Force has been experimental, constructive, and of a research character. The quality and type of aircraft has been under close review, and during the year designs have progressed, especially in the decision to replace wood with metal. The ordering of certain work abroad has led to some criticism, especially as regards parachutes, but the policy of ordering the best is sound, as our incomparable pilots deserve the most up-to-date equipment available. We still suffer in comparison with some other air fleets, and cannot postpone work in the hope of home sources furnishing something better than equipment made abroad.

The controversy of the navy and army having their own airplanes is still functioning, and stands today as a permament difference of opinion. The claim that dual control in war is unsound has not been adequately answered, and the practice of having one system in peace and another for war is unthinkable.

From the point of view of the general public, the development of the commercial side of flying is the most attractive. The Imperial Airways Corporation is going ahead, and in a year's time its service will be touching India. Airship construction is also progressing, and enough is known of the capacity of the two giant craft now on the stocks to realize that they can have their trials and get into service quickly, like a steamship, without loss of time. For this reason the reconditioning of H.M. airship *R-36* will be retarded, and the experimental eastward flights will be undertaken by the new vessels instead.

The New Battleships

Engineering, 25 December, 1925.—H.M.S. *Rodney*, the second of the two new capital ships, was launched on December 17 at the yard of Messrs. Cammell Laird and Co., Limited, of Birkenhead. The first vessel, H.M.S. *Nelson*, was launched early in September at Newcastle, and both should be completed in 1927. These battleships are of particular interest, since they are the first to be built in accordance with the terms of the Washington Treaty, and also the first to embody all the modifications made necessary by war experience.

Until the war, battleship design followed quite a normal course of evolution, and the advance from the Dreadnaught of 1906 to the *Royal Sovereign* class of 1916 was carried out in a series of small steps. None of these ships could be tested under war conditions. The battle of Jutland and other naval engagements gave costly, but extremely valuable, experience, and as a result battleship design was modified to a great extent. As an example of the effect of these modifications, the case of H.M.S. *Hood* may be quoted. This ship was ordered one month before the Jutland action, and was designed as a 36,300-ton battle cruiser, with a load draught of 25 feet 6 inches. After Jutland, although the principal dimensions were not altered, the design was so changed that the final load displacement was 41,200 tons, with a load draught of 28 feet 6 inches. Heavy deck protection was added, and the main armor belt was increased from 8 inches to 12 inches in thickness. Officially the *Hood* is still classed as a battle cruiser, but actually she possesses all the desirable qualities of a battleship, with the added advantage of battle cruiser speed. The *Hood* is a fine example of what can be achieved on a large displacement, and as stated by Major L.

Fea in 1922, it is impossible to unite all the requirements of a modern ship on a displacement less than 40,000 tons.

The modifications to the *Hood* were made within three months of the battle of Jutland. Had the construction been further delayed, it is quite possible that greater alterations would have been made, since only time and discussion can allow radical changes to be seen in their correct perspective. In the case of the *Nelson* and *Rodney,* which were ordered late in 1922, there was no doubt that the relative values of the various features have been thoroughly considered.

But for the Washington Conference, modern capital ships would probably have been super-*Hoods,* with dimensions only limited by building and docking facilities. Fortunately, for the taxpayer at all events, the Conference has effectively stopped this tendency to build such huge warships, and the various naval powers concerned can only build to definite programs with a limit of displacement. The chief clauses of the Treaty which effect the design of new ships are that the standard displacement must not exceed 35,000 tons, and that no capital ship shall carry guns of caliber greater than 16 inches.

These conditions make the task of the naval constructor more difficult than ever, and British constructors have designed the first two vessels in accordance with the terms of the Treaty. At the time when the Conference was held, both America and Japan had ships under construction with 16 inch guns, and displacements about equal to the 35,000-ton limit. The Japanese ships, the *Mutsu* and *Nagato,* were completed in 1921. The first United States ship, the *West Virginia,* was completed in 1921, and the *Colorado* and *Maryland* in 1923. These five, together with the *Nelson* and *Rodney,* will be the only 16-inch gun ships, at least until after 1930, when France is due to complete the first vessel of her replacement program. Great Britain, the United States and Japan cannot commence any further capital ships until 1931, and after that date a fixed building program must be adhered to, and old battleships scrapped as the newer units are completed. On the completion of the *Nelson* and *Rodney,* the *Thunderer, King George V, Ajax* and *Centurion* must be scrapped.

Very few official particulars have been published about the new ships, but the following information was disclosed to all other contracting powers under the terms of the Conference: Standard displacement, 35,000 tons; length on waterline, 702 feet; extreme beam, 106 feet; draught at standard displacement, 30 feet.

The standard displacement given above is that of the completed ship with everything except oil fuel and reserve feed water on board; in the deep load condition the displacement might well be about 40,000 tons. No other official information has been supplied, but various other details have been given from time to time in British and foreign publications, and from these, and photographs illustrating the launches, it is possible to obtain a very good idea of the vessels.

The main armament, according to statements made in the American press, will consist of nine 16-inch guns, with similar ballistic properties to those mounted in the United States *Maryland* class. If this is the case, the whole of the main armament will necessarily be mounted in triple turrets forward, since from launch photographs it is evident there is no provision made for large turrets at the after end, and nine guns can only be mounted in triple turrets. This arrangement will give the *Nelson* and *Rodney* a very unusual appearance; so much space will be taken up by the main armament that the machinery and bridge erections will be a considerable distance aft of midships. It is probable that only the two forward turrets will be able to fire directly ahead. The full mail armament, however, will probably be effective over a wide arc on either beam.

Should the above arrangement of main armament prove to be the one adopted, there is no doubt that it will be criticized when full details are published. The two ships would be ideal for attacking, but the arrangement is contrary to all precedent, and the 16-inch guns would be ineffective if the target ship was astern. The idea itself is revolutionary, but if sufficient armor is provided it certainly seems logical to construct a capital ship of this size for a direct offensive. A slight change of course would bring any following ship into the line of fire of all the 16-inch guns. Further reference will be made to this new arrangement when protection is dealt with.

The secondary armament will be carried in twin turrets, and will presumably consist of 6-inch guns. Here again the launch photograph of the *Nelson* indicates that three of these turrets will be mounted on each side abaft the main armament, and, in fact, well abaft amidships. The photograph also shows that the center turret on each side will be superposed, so that eight guns can fire directly ahead or astern, and six on either beam. In this case, it would seem rather a doubtful advantage to place these turrets so close to one another as they appear to be, since a direct hit on the center turret from a large caliber shell would possibly do great damage to the mountings forward and aft of it. It seems evident that the after deck space will perforce be somewhat cramped.

A powerful anti-aircraft battery will almost certainly be fitted. If the terms of the Washington Conference are not superseded, the *Nelson* and *Rodney* are not due to be scrapped until 1942, and by that time aircraft attack will probably have developed to a very high state of efficiency. No information is available about the type and number of these guns, or of the position of the mountings in the ship.

The torpedo armament also remains a secret. From the fact that torpedo attack caused the famous deployment at Jutland, and virtually closed the action, there is little doubt that torpedo armament is decidedly advantageous. The only objection to its use on battleships like the *Nelson* and *Rodney* is that an ordinary "tube" mounting on deck is unsuitable. Torpedo tubes

	Hood	*Nelson* *Rodney*	*West Virginia* *Colorado* *Maryland*	*Mutsu* *Najato*
	British	British	United States	Japanese
Length on waterline....	850 ft. 0 in.	702 ft. 0 in.	600 ft. 0 in.	700 ft. 0 in. (extreme.)
Beam, extreme	104 ft. 0 in.	106 ft. 0 in.	97 ft. 6 in.	95 ft. 0 in.
Load draught..	28 ft. 6 in.	30 ft. 0 in.	30 ft. 6 in.	30 ft. 0 in.
Load displacement.....	41,200	35,000	32,600	33,800
Shaft horsepower	144,000	.....	28,900	46,000
Speed.....	31	*23	21	23
Main armament.....	8–15 in.	*9–16 in.	8–16 in.	8–16 in.
Secondary armament...	12-5·5in.	*12-6 in.	12-5 in.	20-5·5in.
Main armor belt.....	12 in.	*12 in.	16 in.	13 in.
Barbette armor.....	12 in.	——	18 in.	——

* Unofficial figures.

for these ships should be either submerged, or well protected if above the waterline.

The true reason for the unorthodox appearance of the new ships is probably that war experiences have emphasized the utmost need for armor protection. At Jutland, the *Queen Mary, Indefatigable, Invincible* and probably the *Defence* were all lost through the explosion of magazines due to shell fire, and the only way to avoid losses of this nature is to concentrate sufficient armor over the vitals of the ship. This fact probably explains the unique arrangement of the armament, since by concentrating the guns the armor protection can also be concentrated and its weight reduced to a minimum. The question of weight is all important when a modern battleship has to be designed on a limiting displacement of 35,000 tons. Again quoting American publications, the probable thickness of side armor is given as 12 inches, and that of the turrets as 13 inches, but there are most likely understated. Reference should be made here to the comparative particulars in the accompanying table. In 1924 the present Director of Naval Construction stated that armor and deck protection have been provided which will effectively protect the vitals of the ships when fighting takes place at the ranges which become usual in the last war. Under these circumstances, the thickness quoted for armor would seem inadequate.

The one important lesson learnt in the war with regard to protection from shell fire was that deck armor is an absolute necessity, since with long ranges and high elevation gun mountings the danger of a direct hit on deck is acute. For this reason it is certain that the deck protection of the *Nelson* and *Rodney* will be very complete, especially in the way of magazines and machinery spaces. Turret roofs will also be of the maximum possible thickness, since a shell piercing the turret would probably cause a detonation of the explosives below.

The protection against torpedoes, contrary to recent practice, does not consist of an external bulge below the waterline. With a beam of 106 feet any addition due to bulges would have made docking most difficult, and deck space is probably too valuable in this instance to allow a reduction of width above the waterline. No information is available regarding the internal structure, but on such a large beam it is certain that good torpedo defense can be provided by an "internal bulge" construction.

From the above remarks it will be quite realized that the orthodox battleship appearance has entirely vanished. The forward tripod mast of previous ships has disappeared, and in its place the three huge turrets will loom large to the eye. In place of the funnel, a large steel tower will appear, combining all the functions of bridge, conning tower, range-finder and searchlight platforms. Still further aft, apparently at about a quarter length from the stern, will be the funnel and after mast, with the 6-inch turrets on either side.

The speed of the new ships has been kept a close secret, but in view of the other qualities it cannot be great. One account in the foreign press states that it will be surprising if they prove much faster than the *Royal Sovereign* class, which were designed for 23 knots. Comparing the various features with those of the *Hood*, this does not seem to be unreasonable. The propelling machinery consists of steam turbines. After the weight economy obtained in the *Hood* by the use of small tube boilers, it is only natural to suppose that this type will be adopted in the new battleships.

This article will be incomplete without some reference to the ingenuity which must have been expended in the design of these vessels. No doubt special materials have been used in the construction in order to reduce weight, but this in itself means that extra consideration and care is necessary. Only those who have had actual experience of warship design can realize the huge amount of work which even an orthodox design entails; with the added complications of war experiences and the limitations of the

Washington Conference, the magnitude of the task must have been the greatest that the Royal Corps of Naval Constructors has ever faced. Judging from prevoius ships, however, we may rest assured that the *Nelson* and *Rodney* will eventually be the finest examples of warship design in existence.

The Future of the Battle Cruiser

The Engineer, 18 December, 1925.—It is widely assumed that the Washington Treaty, by restricting the displacement of future capital ships to 35,000 tons—exclusive of fuel and reserve feed water—has definitely "killed" the battle cruiser. As this view has been publicly expressed by naval officers of the highest distinction, some diffidence must be felt in putting forward a contrary opinion. We are emboldened to do so, however, by the reflection that the demise of the battle cruiser was announced shortly after the Washington Treaty saw the light, when there had scarcely been time for a close scrutiny of the clauses relating to new construction. It is possible that many who then thought the battle cruiser doomed have, on maturer consideration, modified that view. In any case, the question has a practical interest for students of naval affairs, since the building of capital ships must be resumed in a few years' time, if this country is to maintain its position at sea. Much may happen, of course, between now and 1931, in which year we are entitled under the Treaty to lay down two further capital ships; but there is no reason to suppose that anything will occur in the interval to shake the faith which the Admiralty, and, for that matter, almost the entire service, retains in the capital ship as the backbone of the fleet. Probably, therefore, the two new ships will duly be laid down in 1931.

With the dimensions of our battle fleet so rigidly limited by international compact, the design of individual ships has become a matter of exceptional importance. The selection of each new type must be governed in large measure by the concurrent building activities of other powers. The *Nelson* and the *Rodney*, our first capital ships begun after the Washington Conference, are battleships pure and simple, vessels of this type being urgently required to bring our fleet up to the ratio of strength prescribed. Understood to be of moderate speed—23 knots has been mentioned unofficially—they are nearer the *Royal Sovereign* than the *Queen Elizabeth* in regard to mobility. In armament and protection they are likely to surpass every other ship afloat. The *Nelsons* will therefore be a valuable reinforcement to the battle fleet; but had it been possible to endow them with a higher speed, their strategical and tactical value would be considerably greater. The advantages of great speed need not be labored. To the British Navy, in particular, it is an asset of inestimable importance, and never more so than at the present time, when the main theater of naval strategy has been transferred from home waters to remote areas, where we do not now, and shall not for years to come, possess the local facilities for maintaining a battle fleet. It follows, therefore, that the rapidity with which our fleet is able to reach the danger zone may be a determining factor in any future campaign. Circumstances may easily be imagined in which six 31-knot *Hoods* would be worth more than eight 23-knot *Nelsons*. So much for the strategical aspect of the question. The tactical utility of high speed is self-evident. Immediately after the war there was, it is true, a tendency in naval circles to favor ships of moderate speed but greatly improved protection. That was but natural, in view of the satisfactory experience our commanders had had with battle cruisers in which resisting power had been ruthlessly sacrificed for the sake of an extra knot or two. What they really wished was to see the two qualities combined in one ship. The design of the *Hood*, and still more that of the four "super-*Hoods*" of 1921, which were cancelled in deference to the Treaty, proves that naval opinion fully appre-

ciates the advantage of great speed, when it does not involve the loss of adequate protection. Our earlier battle cruisers, in spite of their limited powers of resistance, demonstrated their value time and time again. That being so, who can doubt that the same type, in an improved form, would be equally useful in future naval warfare? Our present-day fleet contains four battle cruisers, but although only one is of modern design, it is significant that foreign critics invariably credit the British battle fleet with more than its nominal degree of relative strength because it includes this quartet of fast ships. Battle cruisers represented more than one third of the American post-war building program which the Treaty cancelled; the corresponding Japanese program made provision for an equal number of battleships and battle cruisers. There could be no clearer proof of the esteem in which the battle cruiser is held by international naval opinion than these facts afford. If, therefore, its perpetuation is still possible within the limits of the Treaty, the wisdom of including the battle cruiser type in future building programs hardly calls for argument. It remains, then, to consider the real issue: whether it is feasible to design a ship of 35,000 tons "standard" displacement, which, in addition to adequate armament and protection, would have a speed considerably above that of the ordinary battleship. In the first place, it is important to remember that "standard" displacement does not include fuel or reserve feed water, whereas "normal" displacement, as understood in this country, includes about half the amount of fuel normally carried. Actually, therefore, a standard displacement of 35,000 tons is equivalent to a normal displacement of about 38,000 tons—that is, 11,500 more than the *Renown* and only 3,200 tons less than the *Hood*. The ships named are designed for 31 knots, but future battle cruisers need not of necessity have this very high speed. Ships of 28 or 29 knots would probably answer all requirements, seeing that post-Treaty battleships are never likely to exceed 23 knots. When we consider that the *Queen Elizabeth*, a well-protected ship mounting eight 15 inch guns, with a speed of 25 knots, has a normal displacement of 27,500 tons, it is evident that with an additional 10,500 tons to dispose of, it would not be hard to design a ship with an armament at least as heavy, protection equally good, and a speed of 29 knots. We would go so far as to predict that on a displacement of 38,000 tons it would be possible to mount nine 15 inch 45-caliber guns—as against the 42-caliber guns in *Queen Elizabeth*—to increase the protection to vitals, and to attain with ease a speed of 29 knots. This we believe to be a conservative estimate of what our constructors could accomplish if it were decided to resume the building of battle cruisers. The notion that 16-inch guns, as sanctioned by the Treaty, are a *sine qua non* in all new capital ships, we hold to be fallacious. A new high-velocity gun of the well-tried 15 inch caliber would satisfy all reasonable demands as to range, precision and destructive power. It is unnecessary to recall what happened at Jutland, when the German fleet, mounting nothing larger than 12 inch guns, contrived to make excellent practice against opposing ships armed with 13.5 inch and even 15 inch weapons. If, however, the 16 inch caliber is regarded as indispensable, it would still be practicable to mount this gun in a post-Treaty ship of very high speed by reducing the number of pieces to six. Such a design was worked out by Sir George Thurston in "Brassey's Annual" for 1923. This ship, with a legend—British—displacement of 36,000 tons, was to have 30 knots speed, vertical armor of 13 inch to 14 inch, and a main battery of six 16-inch 45-caliber guns. We consider, however, that nine guns of 15 inch would be preferable for tactical purposes, since the long ranges at which future actions are likely to be fought will render volume of fire a factor of cardinal importance. We are also of opinion that a 15-inch 45-caliber gun, firing the newest type of armor-piercing shell, would be sufficiently powerful to overcome the armor

protection of the strongest battleship now afloat or capable of being built under Treaty constructions.

We repeat our conviction, which we know to be shared by a great many naval officers, that the peculiar necessities of Empire defense render imperative the inclusion of high-speed ships in our future battle fleet. Such vessels would have an advantage that our earlier battle cruisers did not possess, namely, ability to meet battleships on comparatively equal terms. In effect, they would be swift battleships, a type which has always been cherished in the British Navy, and which is now needed more than ever in view of the strategical problems of the post-war era. It is worthy of remark that the Germans, who shared with us the experience of Jutland, continued after the lessons of that action had been pondered over to design battle cruisers which differed from battleships in the weight of their armament. Thus the *Ersatz Freya* and the *Prinz Eitel Friedrich,* laid down in 1917, were each to have mounted eight 14 inch guns, whereas coeval German battleships were provided with the like number of 15 inch guns.

Disarmament Questions

The Naval and Military Record, 23 December, 1925.—We touched recently upon the question as to whether, in any new international agreement upon limitation of naval armaments, there should be a restriction as to size of guns, or whether prohibition should be confined only to displacement. It now appears as though a professional controversy is likely to develop upon the point. One school of opinion definitely holds that there should be no restrictions whatever as to the character of the guns which may be mounted upon a "limit" hull; the other school holds that without such a restriction the salient aim of international agreement, to check rivalry, is likely to be neutralized. It seems to be taken for granted that the capital ship will not figure in this discussion and that the argument will be confined to cruiser design. The question therefore resolves itself into consideration as to whether the principle accepted at the Washington Conference shall be continued, or whether quite a new definition shall be given to it.

The problem is an extremely intricate one, because it involves tactical considerations of supreme importance. Assuming, for the sake of argument, the abrogation of the capital ship, with her disappearance would pass capital ship warfare in the sense in which it has so long been understood. To abolish the idea of the ultimate decision of the "grand clash" in naval warfare is to leave a blank which heavily taxes the powers of foresight. If we abandon the idea of collective fighting by big warships, what are we going to put in place of it? The Great War proved more effectually than ever before that the tactics of the weaker side will be to avoid collective fighting and to employ the guerilla methods of "attrition." Science has greatly developed the possibilities of such evasion. The traditional principle of "seeking out the enemy" is now beset with so many qualifying conditions that it can no longer be laid down as a governing doctrine. The elementary consideration in all warship design is a clear conception of the military purpose for which the ship is required. Unless the naval architect is pretty definitely told what a vessel will be required to do, he cannot possibly be expected to produce a type best fitted to do it.

The old axiom that the whole business of the naval designer is to produce a warship capable of beating the enemy is much too sketchy in this age of complex conditions. It evades all reference as to how the enemy can be compelled to conform to the premise. In fact, it resolves itself into a line of unreasoning competition, expressed in bigger hulls, heavier guns, an ever-increasing burden of armor, and greater speeds. This was the phase which the Washington Conference ended. It had produced the *Hood,* of 43,000 tons, and rumors, probably quite well founded, of the next step to

50,000 tons. If the capital ship idea represents the correct principle of sea warfare, then it logically follows that the most invulnerable capital ship is the best capital ship, which in turn implies that the race in displacement was right, because it was an inevitable concomitant. But by throwing back the standard of size this principle was inferentially denied, and the naval designers were confronted by a new problem. They were no longer left with unrestricted discretion in the building of a ship capable of beating the enemy; they had to build a 35,000-ton ship capable of beating a 35,000-ton ship. In other words, instead of being superior in all the qualities of compromise, they had to determine which is really likely to be the winning factor.

On the other hand, cruiser design down to the time of the Washington Conference had proceeded along the lines of practical experience. The value of mobility was not a new lesson, but it was greatly emphasized by the war. The factor of sea-keeping endurance was also accentuated, more particularly so in view of the uncertainty as to strategical conditions in the next war, the vital zone of which might be ten thousand miles from our home ports. So the competition became one of speed and fuel capacity, which naturally involved greatly increased tonnage. Knots were piled up, whilst armaments made but very trifling relative progress, and protection virtually none. By omitting to place any restriction upon speed the Washington Conference left open a very salient inducement to competition. In actual combatant qualities a 10,000-ton cruiser with 8-inch guns might not prove so superior to a *Hawkins* of 9,500 tons and armed with 7.5 inch guns as to render the result of a duel between the two by any means a foregone conclusion. But the five knots of additional speed would confer upon the former a tactical advantage too self-evident to need any dwelling upon.

It seems to us that the only practical point of limiting displacement is to secure some standard of combatant equality. That the Washington Conference took this view it is reasonable to assume from the fact that they restricted the armament of the cruisers which might be built up to 10,000 tons to 8-inch guns. Presumably the only reason why no speed limit was imposed was because the question did not arise at the Conference, although one might think it should have been a pretty obvious point when assessing the various qualities of fighting efficiency. In earlier cruiser designs we find 9.2-inch guns mounted upon the 7,350 tons displacement of the *Edgar* class, 12-inch guns upon the 9,400 tons of the *Colossus,* and 13.5-inch guns upon the 10,600 tons of the old *Admiral* class. Therefore, the possibilities which emerge from unrestricted liberty in determining the armament of future ships with a limited displacement need no demonstrating. Nor is it certain that the next conference will be satisfied with a restriction of 10,000 tons. If, as is quite conceivable, agreement is reached to abandon all further construction of capital ships, the drop from a maximum of 35,000 tons to a maximum of 10,000 tons will probably be regarded as too extreme. By the same token a maximum of eight inches for the biggest guns is equally likely to raise opposition on the part of a considerable school of thought.

The question of the precise weight of armament that may be ultimately settled upon is not very determined as any other detail of limitation. The should be as definitely determined as any other detail of limitation. The big ship is primarily a gun carriage, and all the features of her fighting efficiency are directed towards employing her guns to greatest advantage. Whatever limits may be set to displacement, there will be inevitable rivalry on the part of the naval powers to produce a ship superior to that of all the rest. If the question of armament is left open, this rivalry will assuredly take the form of a competition in gunpower. One nation will turn out a ship with eight 8-inch guns (let us say). Another will turn out a similar ship with six 9.2-inch guns. Yet another will respond with a similar ship carrying four 12-inch guns. It may be argued that such arma-

ment in unarmored ships would represent a ridiculous misplaced idea; that since such comparatively small ships as are presupposed must necessarily be unarmored if they are to carry such a heavy battery and maintain a very high speed, there is no point in giving them such ponderous weapons, since they can sink one another with very much lighter guns.

This is a perfectly reasonable contention. But the history of naval rivalry goes to prove that it is not always the perfectly reasonable contention that carries the day. The "ship to beat the enemy" idea involves a never-ending process of "going one better," and the choice in this instance must lie between still greater tactical mobility or increased hitting power at extreme ranges. The chief purpose of an international agreement to limit naval armaments is to arrest competition. The Washington Treaty very largely fails in this direction because it sets no restrictions either to numbers or to speed. During the past three years there has been considerable rivalry in cruiser construction, all based upon the simple question of speed. So far we have not gone beyond the 33 knots of the two *Emeralds*, although it is generally understood that our new *County* class will be good for 36 knots. The United States and Japan have 36-knot cruisers in service. France and Italy are constructing vessels which are expected to develop this speed. If gun-power is restricted and no limitation is set to speed the competition will continue and we shall presently have cruisers designed for 40 knots.

This express train mobility is very spectacular, and doubtless holds great tactical possibilities. But it is extremely costly, and there is nothing to justify the present development of it except the competition which has produced it. The Great War certainly holds many examples of the advantages of superior speed. The Battle of the Falklands was only rendered practicable by high speed. Had von Spee's ships been faster he could have got away, although without a base and without supplies his career could not have been a long one. We hold that speed is an essential asset to a cruiser. It is for this very reason that it is bound to remain a factor of rivalry unless a limitation is set to it. Reduced to elementals, the problem is, first forge your weapon, then evolve the swiftest and most effective method of employing it. If we are going to limit the one we must also restrict the other. In fact, if any international agreement upon the limitation of armaments is to be really effective in the way of doing away with competition, it must be as comprehensive as it is possible to render it. To leave loopholes for "a little bit more" in any direction will result in the multiplicity of types and a standing challenge to the principle of response. If we accept the doctrine of limitation of armaments at all (and this is quite another story!), we must accept the consequent disabilities in their entirety. Otherwise the thing becomes a farce.

Economy and Naval Distribution

By Sir Herbert Russell, *The Naval and Military Record*, 6 January, 1926.—Economy is already pretty busy with the fleet, and we have the assurance of the First Lord that reductions on a still bigger scale in the naval organization are contemplated in the near future. True, this comment was apropos of the closing of Pembroke and Rosyth Dockyards and need not necessarily have any reference to the fighting strength of the navy. But beyond economy there looms the prospect—rapidly assuming the proportions of a certainty—of international agreement upon the limitation of armament. We are therefore led to conclude that during the years immediately ahead we shall witness a shrinkage in sea power, and although the government is committed to a very considerable program of new construction, yet the manner in which perfectly serviceable craft in the destroyer reserve are being transferred to the disposal list suggests that there will be little enough compunction in extending this process directly the time is ripe.

As to how much smaller the British Navy is likely to become before the new creed of limitation has reached its goal, that is in the lap of the gods. But the point to which I am now inviting consideration is the manner in which naval reduction is likely to affect the existing organization of naval distribution. If we show our confidence in the rest of humanity by cutting down our sea forces, how are we going to demonstrate the varying degrees of that confidence? It stands to reason that reduction must begin somewhere, and where it does begin will presumably be in those directions in which we assume it may most safely begin. This, of course, is largely a political question, and appears to me to hold the possibilities of considerable misunderstanding. To reduce our strength in one part of the world and maintain it in another would amount to a pretty practical expression of degrees of confidence. Still, the disarmament spirit must be prepared to rise superior to any such invidious implications.

The governing principles of our distribution of naval power in peace time are very simple. The keynote to them all is the consideration of getting the fullest measure of strategical and political value out of our naval strength. In bygone days we have usually found the problem comparatively easy because of the existence of definite rivalries of antagonisms. Out of this more or less permanent condition arose our traditional policy of placing the bulk of our naval force in a situation of best advantage in relation to the naval force of any power, or powers, the aims and interests of which seemed in opposition to our own. This principle kept the greater proportion of our navy in European waters and involved very adequate provision for the defense of the Narrow Seas. When this provision had been fulfilled we were the concentrations of two first-class naval jowers in the Mediterranean. outer seas, and how to allocate this to best advantage.

Since the Great War the balance of naval power has changed so very materially that the problem of disposing our sea strength to fullest advantage has been rather an elusive one. The North Sea and the Atlantic are virtually clear of war squadrons—at all events on such a scale and of such a character as to justify our regarding them as necessitating any organized response. The obvious effect of this changed situation is that the Narrow Seas are probably less in need of guardianship than at any time since Van Tromp swept them.

Perception of this fact resulted in the conclusion that we were not getting the fullest political nor strategical value out of a method of disposal which gave us a dominant Atlantic fleet and a comparatively small Mediterranean fleet. There was no considerable concentration of foreign warships in the Channel, nor in any other part of the Atlantic fleet's cruising zone. There were the concentrations of the first-class naval powers in the Mediterranean. It matters not to the principle involved that both these powers are our very good friends. The real point is that there are strong international naval forces in the Mediterranean, and practically none of first-class moment in other European waters. Where other strong international naval forces are gathered the British Navy is naturally attracted. In short, to put it in the simplest possible terms, our Fleet must go somewhere, and when it is not balancing the forces of open rivalry, as in the past, where better can it go than into those waters over which other flags are flying?

This postulation presumes a general state of world passivity. But, in point of fact, although such a general state of passivity now prevails externally, it is impossible to deny that "strategical zones" still exist. The chief of these is very remote from our own shores. But it is very contiguous to great dominions of the British Empire, and therefore claims the calculating consideration of those who are charged with the most efficient disposal of British sea power. If we really wanted to get the fullest strategical and political value (peace-time value, let me add), out of our battle fleet today we should station it in the Pacific. The economic and material reasons for

not doing this are so self-evident that I need not enumerate them. Indeed, I only mention the point so as to illustrate the principle to which I am referring.

Today, in addition to the Mediterranean fleet, we maintain four overseas naval commands. Of these the China Squadron is numerically the largest, although the East Indies Squadron will shortly compose the largest proportion of the modern ships. For strategical purposes these two commands are regarded as one collective force under the name of the Eastern fleet. The other two commands are the Africa station, the North America, and West Indies station. I am not including as distinctive units such small, localized senior officers' commands as the New Zealand Division, the Persian Gulf Patrol, or the China Rivers' flotillas.

If the question is asked where may reduction in naval strength begin with least detriment to the prestige and, indeed, the power of the British Navy, I think we must answer by saying at home. In the first place, there is no menace to our shores visible anywhere near home. This may sound rather a platitude in view of the fact that there is no naval menace visible anywhere at the present time. But since the essential preliminary condition to all schemes of naval distribution is to ensure the safety of our shores, it is a point to clearly realize.

On the other hand, at the time of writing it yet remains to be seen what attitude Turkey may develop over the Mosul business. The immediate effect has been a treaty with Russia, which country is fortunately negligible as a naval power, at any rate in the Black Sea. But whatever may be Turkey's views on the subject, it needs no laboring that these are likely to be sensibly influence by the presence of a powerful British fleet within a day or two of the Dardanelles. Assuming that we had no such fleet in the Mediterranean. would Turkey be quite so calculating in her policy as she has shown herself, despite her angry protests at the League of Nations award? She realizes that she might pretty successfully attack the British forces in Iraq; she equally realizes that we might pretty successfully attack her up the Dardanelles.

Here, then, is a definite reason why the British main naval force is so much more usefuly disposed in the Middle Sea than it would be in the Narrow Seas. It is not a question of threatening any other Power, but of preventing any other Power from threatening us. The withdrawal of the Third Battle Squadron will still leave the Mediterranean fleet in greater battleship strength (calculated in striking power), than all the other European nations combined, and we must remember that the *Nelson* and *Rodney* are to join that command as soon as they can be completed for service, in addition to the *Royal Sovereigns* detached from the Atlantic fleet.

On purely strategical grounds there is no reason why the North America and West Indies Squadron should not be abolished. The Canadian people apparently are so little concerned in the question of Empire sea power that I do not suppose they would trouble themselves if the White Ensign were withdrawn from the Western Atlantic. It is a matter of common knowledge that the United States would very much like to possess the Bermudas and sundry other West India islands so as to give her command of the Atlantic approach to the Panama Canal, but it would be merely ridiculous to suggest that the continued existence of a small cruiser squadron has any sort of reference to this idea. We cannot even regard it as a policing force, in the same sense as the China Squadron, for example, since there is virtually nothing to police in that placid quarter of the world.

Very much the same thing may be said about the Africa Squadron. Its disappearance would be followed by no threat of a recrudescence of slavery or piracy. And yet, although the strategical situation would be inappreciably affected, who shall say that the disappearance of these two British squadrons would not constitute a very serious blow to our prestige and react prejudici-

ally upon the loyal sentiments of the Dominions? We know that, beyond question, the abolition of the South American Squadron lessoned both our credit and our volume of trade with the continent. It was taken for granted that Britain no longer could afford to maintain that force, and that her hey-day as the greatest naval power in the world was past.

The only terms upon which we could consent to reduce or abolish our naval squadrons in the outer seas are the reduction of other navies to such a degree that the retention of these forces would become a mere anomaly. That we are likely to witness such a process in our time is extremely improbable. The steps which may ultimately tend to such a result will take years to trace, and there are likely to be a good many halts on the way. In any case, our overseas squadrons should be the last either to be diminished or withdrawn. Our amiable Socialist politicians argue that, even although we may continue to keep up a navy for the present, we should at least chain it up in home ports and home waters and not flourish it as a sort of threat to the world. They appear to forget that the most effective way to insure against having to use your weapons is to display them. Your friends are not likely to misunderstand the gesture, and your possible enemies will take the hint.

Thus far, indeed, Admiralty policy appears to be proceeding along these lines. The Atlantic fleet is losing one of its fully-commissioned destroyer flotillas and is giving two of its best battleships in exchange for four of the oldest, to be manned only by reduced complements for the purpose of training boys. Its cruiser squadron has lost a ship, the *Calliope*. The Reserve fleet is being combed-out, more particularly in its destroyer divisions. On the other hand, such changes as are being made in our overseas squadrons are in the direction of increased strength. This seems to me to be the principle of disposing of our naval forces to best advantage.

FRANCE

French Navy Notes

The Naval and Military Record, 6 January, 1926.—The year of 1925 has seen three Ministers of Marine, viz., Dumesnil, Borel, and Leygues, but the Admiralty retained the same chiefs—Admirals Salaun and Pirot, who both belong to the Jeune Ecole persuasion and are partisans of speed and submarines. The meager "light ship program" is being slowly realized without change. Minister Borel, as soon as he attempted to reduce it, fell under public contempt. The new Minister Leygues is taking financial and technical measures with a view to hastening the commissioning of the three 8,000-ton and 36-knot cruisers, of the six 2,400-ton and 36-knot super-destroyers, of the twelve 1,500-ton and 33-knot torpilleurs d'escadre, and of the 18 submarines recently floated. The super-destroyer *Tigre,* that at war load did 35.7 knots for eight hours in rough weather, beat all speed records.

The problem of anti-aerial and anti-torpedo armament on board cruisers is the object of much attention since the launch of the 10,000-ton *Duquesne,* that will carry 8-inch guns. These relatively heavy weapons, rendered more heavy still by the desire of increasing, as much as practicable, range and smashing power, cannot be ranked among bona fide quick-firers, nor can they be expected to provide the volume of fire necessary to repel submarine or small torpedo-boat attacks—a task which 6-inch batteries, as in the British *Esmeralds,* American *Omahas,* and French *Duguay Touins* could perform. Therefore the necessity is being acknowledged to add to the 8-inch armament of 10,000-ton ships a handy quick-firing battery capable of being used against both torpedo and aerial attacks.

The question is: Which is the best caliber? The solution adopted in the *Duquesne* comprises eight cannon of 75-millimeter (the improved famous Army "Soixante-quinze"), and eight one-pounders, plus machine guns. The

requirements of rate and volume of fire are thus being met adequately, but not so those of range and destroying efficiency, especially when is considered the growing distance at which torpedo salvoes are assured of telling effects. It is held the Italians have been wiser in including twelve 4-inch guns in the armament of their *Triestes*. Six-kilo shells can have little or no stopping influence on robust modern submarines and destroyers, whereas 16 kilo shells can have an effective say against all torpedo craft at some 10,000 métres. The contention of officers of the younger school is that 4-inch guns ought to be substituted for the cumbrous, heavy, and useless torpedo-tubes.

Deck torpedo-tubes, it is asserted, are a heresy in 10,000-ton cruisers, nothing but make-believe and dangerous, and for plenty of reasons. Modern cruiser tactics leave hardly any opportunity for the use of broadside torpedo-tubes. End-on actions, pursuits or retreats, will be the rule. Besides, students who are living anew memorable cruiser fights of the last war fail to see what advantage the British cruisers of Beatty or Sturdee or von Spec's cruisers could have derived from torpedo-tubes, and condemn that insane transformation of cruisers into fighting museums. Cruiser fights will begin at extreme range, at least at 15,000 métres; the new so-called croiseurs légers offer longer and loftier targets than most battleships; and there is every chance of deck torpedo-tubes being destroyed and rendered unworkable during the first phase of the encounter. Of course, there is the possibility of surprise and the peculiar conditions of night fighting to consider. But, even in such cases, well-handled gun armament will offer to cruisers their most ready argument and best defense.

The campaign of some English politicians for the abolition of submarines has not had the results that were expected, but has, instead given rise to a retort campaign for the suppression of battleships, described as being solely instruments of conquest and domination, that have no longer and *raison d'être* on the morrow of Locarno kissing, mutual love, and perpetual agreement. Mistaken politicians go so far as to see in the English proposal a clever trick to further disarm France in the name of humanitarian principles. These ungrounded French apprehensions are the direct result of the disappointment experienced at the Washington Conference, that turns out to have been a gross blunder for the main reason that the limitations of armaments then decided were arbitrary and had little to do with fair play. France dislikes the idea of being duped once more on the question of naval disarmament, although she would welcome general disarmament, that would do away with all surface warships at the same time with submarines. Under-populated France obviously covets no new land in the sun and no new markets. There is nothing Imperialistic in the sentiments of her people or in the aims of her Government, that is, besides, too much taken up with internal strife to have any thought for foreign complications.

The unfortunate loss of the British *M-1* has given rise to no end of special articles in the French press and to comments on the folly of putting too many eggs in submarine baskets. Experts of the Laubeuf School anew strongly condemn the policy of mounting big, heavy guns in underwater craft as being detrimental to stability, robustness, maneuvering handiness, and safety. The costly "sousmarine de croisière" building and projected they describe as make-believe and waste of money, since France dreams of no baby-killing warfare à la Boche, and the 1,500-ton boats (*Requin* class), already available, meet all requirements, being good for one month's cruising at a stretch and carrying sixteen 22-inch torpedoes. The numerous colonial points d'appui of France would in practice considerably extend the radius of action of these robust, powerful, and relatively roomy and comfortable boats. In the matter of offensive against cruisers or battleships they are held to be as efficient as the larger boats such as the British "X" class and the French sousmarines de croisière, whilst being less vulnerable to depth charges, torpedoes, mines, or shells, and being much safer in handling.

Officers who have had personal experience with 3,000-ton boats, such as the ex-German *Halbronn* (to be discarded), do not believe in fragile artificial fish of those dimensions, and are dead against the ignorant demand for monster submarines, at least on the old lines, although they would approve submersible armored monitors. The British *X-1*, they claim, though formidable against merchant-ships would be powerless against a cruiser or even a large destroyer. Hence the favor enjoyed by 600-ton boats of the coastal type, that merely require, it is held, to be improved gradually and made stronger. The *Sirène*, first of the series, is ready for her trials in Nantas (chantiers de la Loire).

Although France has given up battleships, attention is being devoted to the epoch-making *Nelson* and *Rodney*, which will outclass all existing battleships, the fine U. S. *Washington* included. The new British capital ships will be the only vessels afloat really benefiting from the full lessons of the war and post-war scientific progress. Not only are they proof against new surface and underwater dangers to a far greater extent than all battleships at present in service, but they embody novel tactical ideas of "offensive à outrance," and appear to be designed either as flagships or as self-supporting independent cruising mastodons. From a superficial examination of their hulls Paris experts guess they are faster than officially acknowledged to be, and also that they have been made with a view to immunity from gas attacks, that deadly danger of tomorrow. Old England thus enters the year 1926, supreme on the water as well as under water for quality still more than for quantity—a fact welcome to thoughtful Frenchmen, who keep alive in their minds the belief in the complete and lasting interdependence of France and Britain both in Europe and in the colonial field.

The rise of Italy is a fact directly concerning France. Instability, party government, corruption, and inefficiency, together with the financial hostility of America, are gradually making a wreck of France, who, leading the Allies to victory, is turning out to be the true victim of the Great War. She is declining; her moral is flinching at the moment when Bocheland is on the right side of bankruptcy and quietly and cutely resuming her program of economic and military domination, and when Italy is ascending at a tremendous rate and making her future on the sea under the guidance of a great statesman of patriotism and will, anxious to revive the Imperialistic traditions of ancient Rome.

Italy is spending enormously towards her sea power, excelling France by the number of her new liners and motorships, as well as by the number of her seaplanes. Her fleet, under skilful, stable management, is strenuously training and expanding outside of the closed Mediterranean. It has acquired an unprecedented degree of readiness for war; it carried out "grandes manœuvres"; the French did not. Sardinia and Sicily are being organized as strong bases of aerial and torpedo offensive between Toulon and Bizerta and between Gibraltar and Malta. The over-populated, expanding, and pushful empire of Dictator Mussolini threatens nobody and has not the slightest idea of treading on the war-path; but it fears nobody, and that is the main point.

AERONAUTICS

The Vickers "Vanguard" Airliner

Aviation, 28 December, 1925.—The Vickers *Vanguard*, a new passenger and freight airliner, primarily intended for use by Imperial Airways on the London-Continental air routes, is a twin engine, twin propeller, tractor biplane, equipped with two Napier "Lion" engines, rated at 450 h. p. each and installed on the lower wings, one on each side of the fuselage.

The machine has an enclosed cabin with ample accommodation for twenty-two passengers, while, at the rear of the cabin, a hold is provided for

carrying baggage. Needless to say, in the event of the plane being adapted to freight work only, the passengers' cabin would be refitted and the freight space would thus be considerable. Lavatory accommodations are also provided. Ahead of the cabin, the open cockpit, high in the nose of the machine, provides for two pilots, with dual controls, one pilot performing the duties of navigator and radio operator when not piloting the plane. The instrument board contains the air speed indicator, altimeter, watches, compass, instrument lighting set, lateral inclinometer, two revolution counters, two oil pressure guages, and oil pressure thermometers. The latter three items are usually mounted on the engine nacelles in clear view of the pilot.

In general appearance, the machine is very similar to the original Vickers *Vimy* commercial plane, though somewhat larger. The characteristic Vickers

AN INTERNAL VIEW OF THE CABIN OF THE VICKERS "VANGUARD"

type biplane tail unit is present and the oval section of the fuselage provides good head room in the cabin. The biplane tail group is arranged with two elevator flaps, one on each individual tail plane, while the three rudders coupled together, of course, serve to provide good directional control.

The engines, Rolls-Royce "Condors," rated at 650 h. p. each, are mounted, one on each side of the fuselage, at the position of the first pair of interplane struts, there being three interplane bays to the wings. According to customary practice, an individual undercarriage, consisting of two wheels, is located directly under each engine mounting.

The main wing spars are of spruce and three-ply box section, with the ribs also of spruce; in fact, this wood is used almost exclusively, throughout. The interplane struts are of this wood, with exception of those which take the weight of the engines, these being of mild steel tube. Internal wing bracing is carried out by means of swaged wires with streamline wires used exclusively for external bracing.

Elm is used for the longerons in the cabin structure, with a covering of three-ply and bulkhead frames of spruce box sections. The rear fuselage

section, on the other hand, is formed of segmented spruce tubes, this being employed for both longerons and bulkhead struts, braced with swaged wires and covered with fabric over a fairing.

The structure of the complete tail unit is very similar to that of the wings although mild steel tubing is employed in the rudders and fins.

In the construction of the actual engine bearers, ash is employed, while, as previously stated, mild steel tubes is used for the interplane struts at these points. Streamline wires brace the engine mounting. The gasoline system consists of main and gravity tanks, the latter situated under the upper wing, just above each engine. The supply from the tanks, which are of thin sheet steel, is carried out by means of Vickers wind driven pumps, while a hand pump is provided as an auxiliary.

Below each engine, the undercarriage Vees are constructed along usual lines, of mild steel tube, with high tensile steel tube used for the axles. Shock absorption in landing and taxiing is carried out through the Oleo pneumatic principle.

The machine is equipped internally to enable light luncheon to be served during flight and tables for this purpose are provided.

The general details of the airplane are as follows:

DIMENSIONS

Overall length	53 ft. 0 in.
Overall height	17 ft. 3 in.
Span (spread)	88 ft. 0 in.
Span (folded)	46 ft. 3 in.
Chord	13 ft. 0 in.
Area of main planes	2,182 sq. ft.
Loading per sq. ft.	8 lb.
Loading per hp. (2—438 hp. @ 2,000 r. p. m.)	20 lb.

WEIGHTS

Aircraft empty with water	10,910 lb.
Gasoline (260 gal.)	1,885 lb.
Oil (18 gal.)	162 lb.
Pilots (2)	360 lb.
Passengers (22 @ 160 lb. each)	3,520 lb.
Baggage	660 lb.
Sundries	103 lb.
Total	17,600 lb.

PERFORMANCE DATA (Calculated)

Full speed near ground	100 m. p. h.
Climb to 5,000 ft.	23 min.
Minimum speed	47 m. p. h.
Duration cruising	470 mi.

A Leader in Commercial Aeronautics

New York Times, Editorial, 19 January, 1926.—In his letter to Chancellor Brown of the New York University announcing a gift of $500,000 to establish a School of Aeronautics Mr. Daniel Guggenheim said that "the great future of aviation and aeronautics is in the promotion of the arts of peace rather than of war." A few months before the outbreak of the great war he and his immediate family endowed the Daniel and Florence Guggenheim Foundation to promote "through charitable and benevolent activities the well-being of mankind throughout the world." Now, in a

letter to Secretary Hoover, he further proves his devotion to aeronautics as an agency of civilization by providing the sum of $2,500,000 "to establish a fund which will cooperate with you and with all agencies of the government and the public generally in advancing the art and science of aeronautics and aviation." Trustees are to be appointed to carry out the donor's purpose. They are to have the use immediately of $500,000 to defray the expenses of their studies and of any preliminary work they may elect to do. He will stand ready to supply $2,000,000 more when they "indicate that the money can be used wisely to promote the aims of the fund." It will be possible "with the sums thus contributed," Mr. Guggenheim thinks, "to bring about such an advance in the art that private enterprise will find it practicable and profitable to 'carry on.'"

As a leader as well as a benefactor in the commercial development of aeronautics, Daniel Guggenheim must be recognized. Nothing could have been more inspiring to workers in the same field than his address on the occasion of turning the sod to mark the beginning of construction for the Aeronautical Building on the University grounds last October. Pledging himself to give the rest of his life to the promotion of the science he had so much at heart, he said:

"I shall do this as part of my duty to my country, whose ample opportunities have been ever at my hand and whose bountiful blessings I have had the good fortune to enjoy."

Mr. Guggenheim regretted that Americans had been singularly lacking in "airmindedness," an intelligence that had prompted Frenchmen, Englishmen, and Germans not only to facilitate the study of aeronautics but to make "air travel, air commerce, the coming and going of airplanes a highly important part of their lives." "We must make haste," he said, "to become first in the air." Again he struck the note of civil progress: "first in the broadest meaning of the phrase." It was of good omen that Orville Wright, survivor of the famous brothers who gave the flying machine to the world, accepted the post of Chairman of the Advisory Committee of the New York University School.

When a private citizen does so much for aeronautics, the country will expect Congress to do its part in making the United States "first in the air." It has been largely responsible for the backwardness of commercial aviation by failing year after year to enact legislation to provide a code of the air, examination of pilots, inspection of machines, and air routes and air fields which could be used by commercial companies as well as by the military services. There has been no good reason for postponing action. Money subsidies are not asked for, but the proposal has been made that air navigation shall have the benefit of facilities similar to those enjoyed by marine and river navigation. Mr. Guggenheim's gift is in the nature of a subsidy, but it is along the lines of public education and the improvement by experimenting of commercial aircraft and equipment. In asking his trustees to cooperate with the Department of Commerce "in every possible manner" he recognizes Secretary Hoover as the government official who has done so much by carrying on investigations and by proposing legislation to advance commercial aeronautics. Mr. Guggenheim predicts that it will be an independent industry in ten years. The credit of initiative and encouragement would be chiefly due to him.

The 1926 American Polar Flight

Aviation, 4 January, 1926.—A new project for the conquest of the North Polar regions by airplane, has recently been launched. The expedition, which is to be commanded by Captain George Hubert Wilkins, Australian explorer an an aviator, will be under the joint auspices of the American Geographical Society, the Detroit Aviation Society, and the North American

Newspaper Alliance. The main object of the flight is not, primarily, to reach the North Pole itself, but to fly over the "Pole of Relative Inaccessibility," which is described as that point actually farthest from any navigable waters; the virtual center of any so called continent, which may exist in these regions.

The most reliable information on the entire project comes from the North American Newspaper Alliance. It is understood that the project has already been financed completely and it is directed by a board of control, headed by William B. Mayo of Detroit, General Manager of the Ford Motor Company. The scientific purposes of the expedition are attested by the presence on this board of Dr. Isaiah Bowman, Director of the American Geographical Society; Vilhjalmar Stefansson, the explorer, and Captain Wilkins, who was one of the chief scientific aides of Ernest Shackleton of his South Polar expedition.

Two airplanes will be used for the flight which will start from Point Barrow, Alaska, about March.

The idea of an airplane flight from Alaska to the Ice Pole occurred independently and almost simultaneously to Wilkins and to Stefansson. Captain Wilkins was in London at the time and proceeded immediately to the United States to go over the proposal with various interested parties, including Dr. Bowman, Mr. Stefansson, and representatives of the Detroit Aviation Society. Following a series of meetings in Detroit, in which Dr. Bowman, Mr. Stefansson, Major Loring Pickering, general manager of the North American Newspaper Alliance, and Captain Wilkins participated, the expedition formally was organized and the Board of Control was named.

Although it is not the primary purpose of Captain Wilkins, who will be in charge of the expedition, to hunt for land, it is generally expected that land will, in fact, be discovered, in view of the belief that a continent exists between Point Barrow, Alaska, and the Ice Pole. Reasons for this belief are mainly concerned with the following facts:

1. The prevailing Arctic winds, as observed and recorded by many explorers, indicate the possibility that a high land point exists in the neighborhood of the Ice Pole;
2. The Arctic tides, as charted by Harris, the American oceanographer, indicate the presence of a mass of land between Point Barrow and the geographical pole;
3. The formation of the earth's surface in other parts of the world, taken with proved geological theories, makes it seem possible that land exists in the unexplored area;
4. Birds, geese, gulls, and eider ducks have been observed flying northward, into the Polar Sea, from Alaska and Siberia, during the early summer. They have been observed returning with fledglings in late summer;
5. Polar soundings, taken by several explorers, indicate that the water of the McKenzie River, pushing its way out under the ice of Beaufort Sea, is divided by some land mass, and
6. Arctic whalers, who have returned from the edge of the ice pack, believe that land exists somewhere within that pack. Their reasons are mainly made up of intangible traditions, founded on the drift of the ice, the winds, the flight of the King eiders, the Ross gulls, and the Hutchins geese!

Some whalers have reported that they saw black masses which may have been land or may have been nothing but the black polar mists. "Keenan's Land" was on the maps for many years, but Stockerson, standing on the polar ice, took observations which showed that there was no land where Keenan's Land was supposed to be.

Stefansson calls the Ice Pole the "Pole of Relative Inaccessibility." It is, when considered from the old viewpoints of polar travel, the most difficult place to reach in the Arctic. It is the point most distant from all the points

reached by ships, being the center of the frozen ice, into which no surface ship has steamed. Instead of being at 90° North longitude 00, the Ice Pole is near 84° North longitude 160. When it is recalled that, until recent years, all polar travel demanded a ship for a base, it was apparent that it was vastly more difficult to reach 84 North, 160 West, than it was to reach the geographical pole. And so no one reached it. The Ice Pole is, as yet, the undiscovered pole.

No explorer has yet ventured toward the center of the ice pack which exists between the Ice Pole and Point Barrow, although several have touched its edge. Peary, on his sledge trip to the geographical pole, was on the opposite side of the sphere. So were Amundsen and Ellsworth on their recent polar flight. Nansen skirted the ice pack in the "Fram." Stefansson skirted with it with his dog teams and sledges.

THE ROUTE OVER THE NORTH POLAR REGION TO BE FOLLOWED BY THE PROPOSED EXPEDITION

Captain Wilkins will take a crew of airplane riggers and mechanics to Fairbanks, the Alaskan railroad terminus, to assemble the airplanes. A group of pilots and mechanics will fly the planes to Point Barrow.

It is expected that two airplanes will be taken to Point Barrow for flight purposes. Either or both may be used on the polar flight or flights. One of these, a Fokker three-engined plane, has already been secured.

Captain Wilkins will rely on the Stefansson method of arctic travel, in case the expedition finds it necessary to make a forced landing on the polar ice. That is, he will attempt to live off the ice.

Peary, Nansen, and nearly all others thought it necessary to carry sufficient food and equipment for a two-way journey, whenever they

ventured out across the frozen polar seas. Amundsen, in general, has always followed the Peary method. He says he does not believe it possible for men to make their living from the ice. The Amundsen-Ellsworth planes went into the arctic carrying sixty-six pounds of food per man. They carried tents, sledges, and a canvas boat, also.

Stefansson, on the other hand, has proved that there are seals under the Arctic ice. He and Wilkins have practiced the three methods by which seals may be taken and have proved that hardy men may live on seal meat alone. Consequently Captain Wilkins will fly "light." He will carry enough food per man to sustain life for only two weeks, the major part of the weight carried being gasoline.

The members of the expedition expect to leave Detroit by rail in January and proceed to the West Coast, thence to Seward by steamer, and on to Tenana, Alaska, by rail. The planes will be rigged at Tenana and flown from there to Barrow. The complete personnel of the expedition has not yet been decided upon.

What Hector Bywater thinks of the recent aircraft controversy is set forth in the January 13 isue of the *Baltimore Sun*. He says:

To say that the court-martial proceedings against Colonel Mitchell were followed with close attention by service men in this country would be to overstate the fact. Some notice was certainly taken of the case, especially by aviation experts; but the truth is that Colonel Mitchell is not accepted here as an authority on the technical and strategical problems of air power, which alone appeal to foreign interest.

He is regarded as an efficient and practical flying man whose war record would lend weight to any views he might express on the actual handling of aircraft and even on the organization of air forces for cooperation with a field army. His knowledge and experience on those subjects are probably no greater and no less than those of many other senior air officers of all nationalities who served in the World War. But on the broad question of air power versus military and naval power Colonel Mitchell's opinions are discounted here as those of a zealous but ill-informed amateur.

His admissions during the court-martial that he knew nothing of rudimentary technical facts relating to naval warfare were scarcely needed after the extraordinary statements to which he had committed himself in the newspaper communique that brought about his trial. Statements hardly less stupefying had previously been made by him in a series of magazine articles on air power.

Captain Dudley Knox, U. S. Navy, has already exposed in *The Sun* the absurdity of the claim that the United States fleet would be instantly annihilated by mines and submarines if it ventured to leave San Francisco harbor in war time. But Colonel Mitchell's articles must have been read by millions of Americans who accept them as gospel, coming as they do from one who is popularly regarded as the highest authority on aviation. One can therefore sympathize with American Army and Navy writers in their thankless task of nailing down a series of preposterous claims which, if allowed to pass unchallenged, must inevitably undermine the nation's confidence in its land and sea defenses.

It is always dangerous to make a publicity stunt of any subject pertaining to national defense. Gabriel Charmes and other leaders of the "Jeune Ecole" did this in France some forty years since, and their heresies nearly wrecked the French Navy. Admiral Sir Percy Scott might have done a similar disservice to the British Navy by his intemperate campaign against the battleship had it not been that his offensive was launched only a few weeks before the World War begun, and was therefore speedily overlaid by greater and more immediate issues.

True, he revived it after the war, but by that time the public had formed its own opinion about the value of battleships, and Sir Percy found himself crying in the wilderness.

To anyone who has studied the progress of armament in modern times the present controversy on air power has a familiar ring. Not once but a dozen times has the arrival of a new weapon evoked prophecies of a complete revolution in the art of war. When the shell-gun was first introduced by Colonel Paixhans early in the nineteenth century the world was assured that sea fights were a thing of the past, because no ship could survive for a minute the explosive and incendiary effect of the new projectiles.

When the ram scored an isolated but spectacular success at the battle of Lissa in 1866—thus appearing to confirm experience in the American Civil War—naval opinion in all countries grew dubious as to the value of gunfire and forthwith went "all out" for ramming tactics, with the result that only a few years before the coming of the dreadnaught elderly naval officers were still drawing up battle plans based primarily on the use of the ram.

On the outbreak of the Franco-German War in 1870 one of the highest military authorities in Europe publicly forecast that the contending armies would obliterate themselves in the first engagement: the French sweeping away whole army corps by the fire of their mitrailleuses, while the German needle-gun laid low the French in regiments.

Undismayed by the falsification of their predictions the prophets kept right on up to the World War. In the nineties M. de Bloch proved to his own satisfaction, and that of millions of his admirers, first, that war between the great civilized nations had become impossible, and, second, that if the impossible did happen, war would begin and end within a week owing to the reciprocal destruction of the contending forces.

It may be that aircraft are indeed destined either to change the face of war or abolish it altogether. All we can say with certitude is that neither development is immediately foreshadowed. Military men here indorse that phrase in the Dwight Morrow report which declares that while the next war may begin in the air it will probably end, as the late war ended, in the mud.

In the realm of naval warfare the issue is defined more clearly. Here it is a question of radius plus offensive power, and the plain fact is that aircraft in their present stage represent an untried and purely experimental means of offense. Their value, nay, their indespensability as an adjunct to naval force, has long since been conceded. What is still problematic is their ability to supersede any conventional naval unit, from battleship to destroyer or submarine. It is, however, a positive and demonstrable fact that no existing type of marine bombing airplane can sink or even cripple a major warship.

An intriguing feature of the American air controversy has been the insistence laid by the Mitchell school on the exposure of American continental territory to attack from the sky. It is still uncertain whether Colonel Mitchell believes that the United States even now lies open to invasion by aircraft flying direct from Europe or Asia. Passages in his press articles, and in his evidence at the trial, suggest that he does. If so, he has cognizance of super-aircraft of which European experts profess their entire ignorance.

If he is referring to Zeppelins, his warning will hardly be taken seriously. The American air force would surely ask nothing better than an enemy should send his dirigibles on such a mission. Apparently, however, Colonel Mitchell means that giant airplanes will cross the intervening ocean and lay New York, Washington, and Chicago in ruins. This is certainly not possible at present, and unless the development of heavier-than-air craft is enormously accelerated it may be several decades before a trans-oceanic airplane is perfected.

By concentrating on the supposed menace of air invasion from oversea, Colonel Mitchell unwittingly gave a splendid advertisement to the United States Navy, for it must be evident to all thinking Americans that since hostile aircraft can only be brought within range of their coast on board ships a strong navy is the one and only sure safeguard against that form of attack.

The Commercial Use of Wright Whirlwind 200 h.p. Air-Cooled Engines

Aviation, 16 January, 1926.—One of the best proofs of the advantages of Wright Whirlwind 200 h.p. air-cooled engines for commercial aviation, is the rapid increase in the quantities being sold. In addition to the hundreds of these Wright Whirlwind engines, which have been purchased by the Navy, the Wright Company has sold 124 Whirlwinds to customers other than the United States Government. Many of these sales represented one engine only, which is an indication that larger repeat orders may be expected to come in, in the near future. Five of the orders were repeat orders, which indicate the satisfaction given by the Whirlwind engines on the initial orders.

It is interesting to learn that in December alone, seven orders were received from various commercial aviation interests, for Wright Whirlwind engines. These December orders total up to not less than sixty engines.

Of this total the 124 Whirlwinds going to other buyers than the U.S. Government, it is interesting to note the increase in the rate of sales of this size of engine. Previous to 1924, only one was sold to an outside customer. In the latter months of 1924 seven were sold of the total of 124. Of the orders for sixty engines received in December, many of the deliveries will be made during the early months of the new year.

It is an old saying with fliers that the "sun never sets on Wright engines." The use to which these 124 Wright Whirlwind engines are put is a proof of this saying. Some of the Whirlwinds are for use on the polar flight to be made by Captain Wilkins on the Detroit Arctic Expedition, while others are being used in Peru and Brazil, just below the equator. The uses to which these commercial Wright Whirlwind engines are put cover practically the whole of commercial aviation, including passenger carrying, mail and express carrying, exploration, forest surveying, forest fire patrol work, photography, mapping, boll weevil dusting, mosquito extermination, training, and private owners' use.

The eagerness of airplane designers to take advantage of the commercial possibilities of the Whirlwind is shown by the fact that twelve new models of strictly commercial planes have been made by representative builders, using the Wright Whirlwind engine as the power plant. The durability, economy and high performance of these engines appeal to the designer as much as to the pilot. Furthermore, several types of planes that have hitherto used older types of power plants, have come into their own when powered with these modern Whirlwind 200 h.p. air-cooled engines.

For instance, the large three-engine, ten-passenger airliners built by the Fokker Company, and the Stout Metal Airplane Division of the Ford Motor Company, both utilize Whirlwind engines as power plants. Both of these three-engine planes were primarily designed for one 400 h.p. water-cooled engine, but the light weight of 200 h.p. Whirlwind adds only a few hundred pounds to the total weight of the plane, although the power is increased from 400 h.p. to 600 h.p. A degree of dependability is added by having the three individual engines, which cannot be over-estimated in considering the safety of the plane. There is no question that for passenger carrying in large planes, the machines must be fitted with at least 3 engines and be able to fly properly with any one of the engines stopped. This has been ac-

complished in these big airliners, as exemplified by the splendid performance of the Fokker plane in the Ford Reliability Tour, on its recent trip to Havana and return and the thousands of miles of miscellaneous flying it has done. The tests of the Stout three-engine plane are progressing satisfactorily.

The Whirlwind engine has increased the performance of the Curtiss Lark over the performance obtained with the lower power engine, making this an exceedingly useful plane for general commercial purposes. It is one of the outstanding planes in the open cockpit class. The first one of these Larks to be delivered to a commercial user was delivered to the Florida Airways Corporation. Immediately after taking delivery of this plane, Major Reed Chambers, organizer and president of the Florida Airways Corporation, flew the *Lark* to Florida and return, using commercial gasoline much of the way and having a splendid trip.

The Huff Daland Company have built two commercial planes in 1925 with Whirlwinds. Credit should be given the Huff Daland organization for their courageous blazing of the 1925 trail in commercial aeronautics. This company, in establishing its fleet of fourteen new planes for cotton boll weevil dusting, undertook one of the largest commercial projects entered into in the world, without aid of a government subsidy. The Huff Daland "duster" plane is powered with the Whirlwind engine. The Huff Daland Company have built another excellent photographic plane, for a private customer, with the Whirlwind. This Huff Daland photographic plane incorporates many of the features which made their water-cooled photographic plane so excellent, but the faster climb and higher ceiling obtained with the Whirlwind add further to the value of this photographic plane.

Air Travel Growing More Safe

New York Times, 23 January, 1926, Cincinnati, Ohio.—Air travel is becoming safer both in America and Europe, Professor Joseph W. Roe, head of the department of industrial engineering in New York University, declared in an address this week on civil aviation before the Engineers' Club of Cincinnati.

"The United States Air Mail during three years," he said, "transported 159,843,096 letters, of which only 125 pounds, or approximately 5,000 letters, were lost or destroyed. This number is about half the percentage of losses of registered packages transported by United States railroads."

Hazard to pilots in the Air Mail Service during the last four fiscal years of operation was much less than during the first four years, according to Professor Roe.

"The record," he said, "shows increase of 470 per cent in safety in the second period, as compared with the first, and is remarkable in that the fiscal year 1925 includes approximately 700,000 miles of regular scheduled night flying, in all seasons and weather.

The record of the United States Army Air Service, including all classes of flying personnel killed in army aircraft, indicates an encouraging decrease in military flying hazards.

During the first four years 2,635,433 miles were flown, and nineteen pilots were killed. During the last four years 7,891,099 miles were flown and ten pilots were killed. In other words, one pilot to every 138,600 miles lost his life in the first period, and one pilot to every 789,110 lost his life in the second period."

For five years, Professor Roe said, there was no record of any pilot or passenger fatality in regular air transportation service in Germany, Poland, Denmark, and Colombia.

"During the last twelve months for which accurate records are available," he continued, 63,706 passengers were carried on regular air transportation routes in Europe, and 5,927,356 miles were flown.

Twelve passengers were killed, or an average of 494,000 machine miles flown per fatality. The average number of passengers carried per machine flight for all European operations in 1925 is about 2.5. Hence the number of passenger air miles per passenger fatality for 1924 was approximately 1,235,000.

British flying hazards are shown to be less than those of the French lines over a period of five years.

Freedom of goods from loss or damage is reflected in the records of air lines in other countries. The service in Colombia, South America; along the Magdalena River, has carried 55,592 pounds of mail in five years without the loss of a letter."

The economic use of air transport for mail and goods, Professor Roe said, begins at distances requiring at least a night's run by rail. Air mail services were started between New York and Washington in 1919, and in 1920 between Chicago and St. Louis, and Chicago and the St. Paul-Minneapolis, Professor Roe added:

"They were discontinued in 1921 because in each case a letter mailed at the end of the day would arrive at destination by rail in time for the first delivery in the morning. As most business mail and express move at night, there was no advantage in the air service.

Resumption on the basis of contract operation of two of these lines from Chicago and St. Paul-Minneapolis and Chicago to St. Louis, is justified now because they will be parts of a nation-wide system carrying long distance mail, whereas, before, they were short detached units.

It is thought by some that the first development in air passenger service will be short 'day-hops' from one large city to another and return before the end of business on the same day. It is possible that passenger traffic may begin in this manner, but it is probable that most air lines in this country will be developed first for mail and goods.

Traffic conditions in the United States are more favorable for air transport than in Europe. The United States has large centers of population, many of them long distances apart and the traffic, unhampered by national boundaries, is very active."

"Air transportation is everywhere in competition with some form of existing surface transportation. It will attract traffic only on the basis of a favorable combination of speed, safety, reliability, cost and availability.

All five of these elements are involved. High excellence in one alone will not suffice if the others are low. Speed alone if obtained at the expense of safety, reliability and cost will not attract traffic.

An air line having all of the first four elements will not succeed, if the service is not available at the right times and hours. Night flying was inaugurated on the Air Mail to meet exactly this condition. Finally, the traffic resulting from the above elements must be sufficient in volume to support operations.

Topography affects air transport as well as surface transport, but to a somewhat less degree. Mountains even of moderate height materially affect railway routes, which follow the main water courses.

In the eastern United States there are no mountains high enough to interfere seriously with probable air routes. Most of the mountain ranges in the East do not exceed 3,000 feet in height.

High mountain ranges such as the Rockies render air traffic more difficult, but do not render it impossible. The chief effect of mountainous country is to increase the cost of establishing airways with the necessary emergency landing fields, and to increase the unit cost of operation through the diminished performance of airplanes, at high altitudes."

ENGINEERING

The Use of High-Pressure Steam

The Engineer, 25 December, 1925.—During the last few years the term "high-pressure steam" has taken on a new significance. Not so very long ago it could have been fairly applied to any pressure exceeding 200 pounds per square inch, but so great has been the progress in the art of generating and using steam that, at any rate so far as power station practice is concerned, the high pressure of a generation ago is the low pressure of today. Neglecting the pioneer work of Jacob Perkins, which fell on stony ground, the first step towards the use of modern pressures was the adoption of a boiler pressure of 275 pounds per square inch at the Carville station of the Newcastle-upon-Tyne company in 1913. This station at once established a record for thermal efficiency, and its success emboldened the company to advance to so high a gauge pressure as 475 pounds per square inch in its North Tees station some four years later. The opening of the latter station really marked the commencement of the modern era of high pressures. It demonstrated that such practical difficulties as there were could be overcome, and that the theoretical advantages of higher pressures and temperatures could be largely realized. Caution or conservatism has so far prevented the general adoption in new power stations of pressures as high as that in use at North Tees, but much higher pressures are now in successful use abroad. The American Gas and Electric Company has had two very large stations, at Philo and Twin Branch respectively, operating for more than a year at a pressure of 550 pounds per square inch. The new Crawford-avenue station at Chicago, for which a 50,000-kilowatt Parsons turbine has recently been supplied, works with a boiler pressure of 600 pounds per square inch. Three boilers working at a pressure of 725 pounds per square inch have recently been put into operation at the Langerbrugge station of the Centrales Electriques des Flandres. The Atmos boiler at 1500 pounds per square inch has been working in Sweden for some time, and several tests have been carried out on the Benson boiler at Rugby at a pressure of 3000 pounds per square inch. Although these latter types do not fall within the category of central station practice at present, their development is interesting as showing the trend of events. Indeed, it will not be long before we have information as to the performance in service of the 1200 pound Babcock boiler at the Weymouth station of the Edison Illuminating Company, which is notable for the construction of the drum as a one-piece forging, with wall thickness of 4 inches. The same kind *of* drum construction is being used for the 650 pound boiler which is shortly to be installed at Amsterdam. This boiler is remarkable also for its size, being designed for the enormous evaporative capacity of 180,000 pound per hour at normal rating. The drum is 4 feet diameter by over 34 feet long, and double circulation through the tubes is adopted.

There are other high-pressure boilers in use or under construction for power stations, and a start is being made in marine practice by the 550 pound Yarrow boilers now being built for a vessel on the Clyde. Enough however, has been said to show that high-pressure steam has already taken a definite place in modern practice. With regard to the safety of boilers under such pressures, Sir James Kemnal has expressed himself as perfectly satisfied. Discussing the subject at a meeting of the Institution of Marine Engineers about a year ago, he raised the interesting point that *whereas* the bursting pressure of a 200 pound boiler, with a factor of safety of 5, could conceivably be reached in practice, no attainable pressure could burst a 1000 pound boiler constructed with the same factor of safety. Such boilers as burst, however, always do so at a pressure much lower than that at which the designer thought they would, so Sir James' argument has its limitations. Corrosion, abuse and bad workmanship may nullify all the margin of safety allowed by the designer, and the higher the pressure the

sooner will original or acquired defects become dangerous. Fortunately, up to the present no serious accidents have occurred with high-pressure boilers, and with proper care there is no reason to anticipate any. Furthermore, the opinion of users of very high pressures seem to show that the minor troubles have been much less than many people would have imagined. The metal-to-metal joint with a corrugated steel ring between the flanges, seems to have solved the question of steam-tight pipe joints. The breakage of gauge glasses has been abolished by the development of water-level indicators and the consequent elimination of gauge glasses altogether. The only outstanding trouble at the moment seems to be the cutting of valve seats by the leakage of steam at high pressure. With improved design and more suitable material, this difficulty is likely to disappear. At Weymouth, and also, we believe, at Langerbrugge, the main safety valves are protected by small pilot valves set to lift at a slightly lower pressure. When these blow, they serve as a warning to the fireman, who then takes steps to reduce the boiler pressure in order to prevent the main valves coming into operation. The pilot valves, being not essential to operation, can have their seatings attended to when necessary. A peculiar feature of the progress being made towards higher pressures is the erratic nature of the advance. In England, after the 475 pounds of North Tees we have 375 pounds at Barking; in America after the 1200 pounds at Boston, we find 400 pounds chosen for the new 600,000-kilowatt station at Richmond; and on the continent of Europe the 650 pounds of Amsterdam will follow the 725 pounds of Langerbrugge. Meanwhile, the more conservative engineers in all countries are still putting down important plants for pressures well below 400 pounds. Making all allowances for the special circumstances of individual stations, there certainly appears to be a wide divergency of opinion as to what are the optimum steam conditions for a large modern power plant. The increased thermal efficiencies corresponding to higher and higher pressures and superheats are calculable with great accuracy, but a time comes in the opinion of every engineer when any extra efficiency to be gained is more than offset by the extra expense risk and trouble which the appropriate equipment would incur. The point at which the game ceases to be worth the candle is at the moment almost entirely a matter of individual judgment; hence, the wide diversity of practice. As data become available as to the overall economies as well as to the thermal efficiencies obtained by the present pioneers, practice will no doubt settle down and a comparative standardization of pressures and temperatures for large stations will be arrived at. The upper limits of these two factors were discussed by Professors Mellanby and Kerr a year ago before the North-East Coast Institution of Engineers and Shipbuilders. These authors considered that with such materials as are available a pressure of 1250 pounds per square inch and a steam temperature of 900° F. could not be properly exceeded. The former, it will be noted, is closely approached by the Weymouth station already mentioned, while the temperature of 842° F. which has been adopted at Langerbrugge is also well on the way to the other limit specified.

It is, of course, not in the generation of steam at these high pressures and temperatures that extra efficiency is to be expected. The Bow power station in London, with a steam pressure of only 265 pounds, has already shown a boiler efficiency exceeding 84 per cent over a month's ordinary working, and any possible margin for improvement on this figure is at least as open to a low-pressure station as to one at a higher pressure. A perfect boiler, working at any pressure, would have an efficiency of 100 per cent, but the efficiency with which the heat supplied can be turned into work by a perfect plant will depend both on the quality of the steam furnished and the nature of the thermal cycle. Taking the well-known Rankine cycle as representing ideal conditions when regenerative heating is not adopted, a perfect turbine working with 300 pounds absolute pressure, a temperature

of 650° F., and a vacuum of 29 inches, can turn about 34.8 per cent of the heat supplied into work. Raising the pressure alone to 1000 pounds will increase the proportion to 38.5 per cent; raising temperature alone to 800° F. will result in an efficiency of 35 per cent; whereas if both temperature and pressure are simultaneously raised to the figures given the resulting efficiency will be 39.6 per cent. It will be noted that what may be called permissible pressure rises are theoretically much more conducive to efficiency than permissible temperature rises, the reason, of course, being that the higher the pressure at which steam is generated, the higher the temperature at which the main part of the heat is put into the working fluid. With regenerative feed heating and steam reheating, as adopted in large modern power stations, not only would the cycle efficiencies be considerably greater than those given above for the Rankine series of operations, but for any specified vacuum and steam temperature, the theoretical advantage of raising the pressure becomes somewhat more marked. The extent to which these theoretical cycle efficiencies can be approached in practice is another matter. Indeed, it is more often a question as to whether it is economically sound to strive even for the highest attainable thermal efficiency. Extra high-pressure plant costs a lot of money, for besides the special types of boilers and turbines required, there are also the feed pumps, feed and steam ranges, and innumerable fittings to be considered. By maintaining moderate pressures and raising temperatures to higher values than have yet been adopted, although the increase of theoretical efficiency is by no means so great, the only portions of the plant to be affected would be the superheater, steam range, the high-pressure end of the turbine, and sundry fittings. The possibilities of this alternative have been discussed by Professor A. G. Christie and D. C. Turnbull in a recent report of the Prime Movers Committee of the National Electric Light Association on "Higher Steam Pressures and Temperatures." Anticipating the availability of metal which will stand working temperatures of 1060° F. at moderate pressures, they give calculations to show that a 30,000-kilowatt plant using steam at 400 pounds pressure and 1000° temperature should show a thermal performance as good as that of a plant of equal size using steam at 1200 pound pressure and 700° temperature, a regenerative cycle being assumed in both cases. The authors themselves admit that several of their assumptions are open to doubt, and their conclusion is certainly not one to be accepted without question. The advantages to be gained by increasing temperatures to a point beyond the range of existing practice are, however, certainly considerable, and if metallurgists can provide material which will permit of this, not only will steam practice be benefited, but we may be one stage nearer to the day of the gas turbine—unless indeed, red-hot steam takes away the advantages of using a gas turbine at all.

Motor Ships and Marine Oil Engine in 1925

The Engineer, 1 January, 1926.—The past year, which began with the maiden voyage of the *Aorangi* and ended with the handing over of the *Gripsholm* and the completion of the *Asturias,* not only saw the definite arrival of the large motor passenger liner, but it also held much of interest to the designer of marine oil engines and the motor ship builder. In spite of the world depression in shipbuilding, in which Great Britain fully shared, our leading position as motor shipbuilders was more than held. Technical advance and greater stardardization in the construction of hulls and machinery proceeded side by side, with the result that the position of this most important industry was improved and strengthened. The actual number of ships which were built and engined in British yards differed little from that of last year, but the gross tonnage and the total horse-power of the propelling machinery was increased. In accordance with our usual practice

in recent years we have tabulated the returns of builders and engine makers regarding motor ships completed within the year, and in the following table a summary of the figures for the years 1920-25 is given:

Table I.—*Vessels of* 1000 *Gross Tons and Upwards Fitted with Marine Oil Engines and Completed in Great Britain and Ireland during the Years* 1920–1925 *inclusive.*

Year.....	1920	1921	1922	1923	1924	1925
Number of motor ships completed...	7	15	17	14	43	44
Total gross tons.....	53,407	83,980	114,527	78,862	231,764	282,325
Total I.H.P. of propelling machinery .	31,140	42,860	69,820	49,137	145,130	180,125

The majority of the new ships will take up service on British and colonial trade routes. Two ships, the *Elmworth* and *Oakworth* were completed late in 1924.

Referring to the cost of motor ships, we may recall the consternation which was felt throughout the industry and the country at large when early in March it was announced that an order for five 440 foot motor ships of 10,000 tons dead-weight carrying capacity for the Prince Line had been placed by Furness, Withy and Company, Limited, with the Deutsche Werft, of Hamburg. The difference in price between the lowest British tender and the German offer was £60,000 per ship, an amount which was difficult to explain, even after making allowance for increased standardization, longer working hours, lower wages, rates and taxes, freedom from demarcation troubles, and other conditions incidental to the then German shipyard practice. The fact that when asked to tender for two slightly larger ships for the British Molasses Company, Limited, the same firm of builders quoted a higher price than did British yards, seemed to indicate that the previous price was on the low side. At any rate, the incident had the effect of calling together a joint conference of representatives of the Shipbuilding Employers' Federation and the unions of the shipyard workers. The first part of the inquiry was concluded and the report upon it formed the subject of a leading article in our issue of October 23. A further investigation into outside costs and their effect on the shipbuilding industry is now being undertaken. Whatever be the results of this inquiry, and how far the report regarding demarcation and labor conditions will be applied, cannot yet be determined, but it may be confidently stated that in the year that is past British shipbuilders succeeded in reducing their costs of production, and improving the organization of their yards, so that they are now in a much better position to cope with foreign competition.

Double-Acting Engines

One of the most important developments of the year took place in connection with double-acting engines. Engines of this pattern are now built both on the four-stroke and two-stroke principle, and various units aggregating over 200,000 brake horse-power are under construction. We shall deal first with the four-cycle double-acting engine of the Burmeister and Wain type. Some knowledge of this new type of prime mover was gained from a paper by Mr. H. H. Blache given before the Institution of Engineers and Shipbuilders, which was published in *The Engineer* of February 27. The first two engines built to this design were for the Swedish-American liner *Gripsholm*. Their completion was somewhat delayed by labor troubles, but trials were run towards the end of November. Each of the twin engines has six 33 1/16 inch bore cylinders, with a stroke of 59 1/16 inch, designed from an output of 7250 brake horse-power at a speed of 125

revolutions per minute. The compressors are separately driven by auxiliary Diesel engines. Satisfactory trials were carried out, but it was deemed advisable to modify the propellers slightly in order to allow full engine power to be developed at a somewhat lower speed of revolution. The *Gripsholm* left Gothenburg on November 21 and arrived in New York on the 30, after a non-stop run, the engines developing 15,740 mean indicated horse-power at 116 revolutions per minute. It is reported that vibration was practically non-existent. Two other engines of this type were completed by Harland and Wolff for the Royal Mail Steam Packet Company's 20,500-ton passenger liner *Asturias*, which will begin her trials this month. Figure 1 shows her during fitting out at her builder's yard in Belfast, attended by the 150-ton floating crane. Her low, broad funnels and well-raked masts give her a particularly powerful and distinctive appearance. Each of her twin-screw main engines is designed for a normal output of 7500 brake horse-power, or 10,000 indicated horse-power, per shaft, with eight cylinders, each 33 1/16 inch diameter with a stroke of 59 1/16 inch. The service speed of the engines is fixed at 115 revolutions per minute. Unlike the engines of the *Gripsholm*, the air compressors are driven from the main crank shaft, and comprise two cylinders placed at the forward end of the engine. Engines of this type totalling some 100,000 horse-power are under construction at Belfast.

The successful trials made on the experimental single-cylinder North-Eastern-Werkspoor engine at Wallsend in 1924 were, in 1925, extended with improved valve gear, and in the autumn an eighty days' non-stop run was made, which to date is one of the longest trials ever recorded. The new type of valve gear referred to was designed by Mr. C. J. Lugt, of Werkspoor, Amsterdam, and Mr. C. Zulver, of the Anglo-Saxon Petroleum Company, Limited, for which firm multi-cylinder, double-acting oil engines are being built at Amsterdam and at Wallsend. In the new patented valve gear a central fuel valve is employed, surrounded by six small mushroom type valves, which are made to serve alternately as exhaust and air inlet valves. The small valves are put into communication with the respective valve passages by a rotary sleeve valve, provided with ports. The rotary valve is operated by a rack and pinion driven from the control shaft. We understand that in the trial referred to this new type of gear gave excellent results. The first double-acting engine to be completed will be a set for Alfred Holt and Company, of Liverpool, which will be tested very shortly.

Following the successful installation of Richardsons-Beardmore-Tosi engines in the two vessels *Sycamore* and *Tramore*, Richardsons, Westgarth and Company, Limited, come to the decision that single-acting engines, especially of the four-cycle type, leave much to be desired from the all-round financial standpoint of the shipowner and accordingly devoted themselves to the construction of a single-cylinder, two-cycle, double-acting engine. That engine will be tested early in the year. It has a cylinder 26¾ inches in diameter, with a 47¼ inch stroke, and is designed to develop its full power at 90 revolutions per minute.

During the past year another engine of the North British two-cycle, double-acting, sliding-cylinder type was completed and was installed in the cargo ship the *City of Stockholm*. The North British Engine Works have now been taken over by Barclay, Curle and Company, Limited, and will form the headquarters of that company.

Other double-acting engines have been built abroad, and some reference to them will be found in those sections of this article which deal with progress made in America, Italy, and in Germany.

Single-Acting Four-Cycle Engines

The place of honor as regards the largest number of four-cycle single-acting engines constructed during the year again falls to Harland and Wolff,

Limited, which firm completed no less than twenty-seven sets of machinery of the Harland-B. and W. type. From details of these engines it will be seen that included amongst them are eighteen sets of similar machinery for the Bank Line ships, along with engines of the long-stroke pattern and the new light pattern with trunk pistons. At Greenock, J. G. Kincaid and Company, Limited, built six sets of engines of the standard Harland-B. and W. pattern, whilst at Bedford W. H. Allen, Sons and Company, Limited, supplied several sets of auxiliary engines of this same type.

The North-Eastern Marine Engineering Company, Limited, completed during the year a large North-Eastern-Werkspoor motor for the *Raby Castle*—a vessel built for the Lancashire Shipping Company, Limited, by the Caledon Shipbuilding and Engineering Company, Limited, of Dundee. A full account of this cargo ship and her machinery was given in *The Engineer* of April 24. Two other Hawthorn, Leslie-Werkspoor engines will be installed in a tanker which was launched at Lithgows, Limited, of Port-Glasgow.

At Dalmuir no ships were engined with Beardmore-Tosi engines, but we understand that several auxiliary units for naval use were completed.

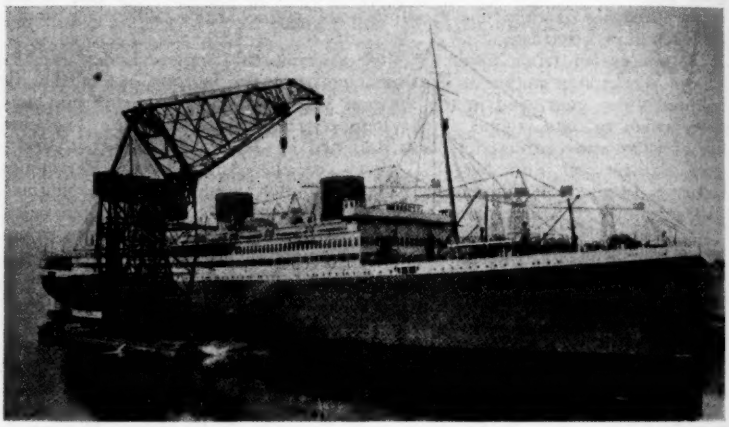

FIG. 1—R.M.S.P. MOTOR PASSENGER LINER "ASTURIAS"

SINGLE-ACTING TWO-CYCLE ENGINES

The first place among engines of the two-cycle, single-acting type falls again to the Sulzer type of motor, for during the year no less than 141 engines, representing a total output of about 150,000 brake horse-power, were built by Sulzer Brothers, of Winterthur, its associated companies and licensees. An outstanding ship of the year was the *Aorangi*. Her running experience throughout the year was, we are given to understand, satisfactory. The Fairfield Shipbuilding and Engineering Company, Limited, also completed the Houlder Line refrigerator ship *Upwey Grange*. Other Sulzer engined vessels were built by Sir W. G. Armstrong, Whitworth and Company, Limited, and John Brown and Company, Limited. In the last weeks of the year a new type of Brown-Sulzer engine was tested. It is the largest size of marine oil engine yet constructed in Great Britain. It has four cylinders, each 35½ inches diameter, with a stroke of 63 inches, and was designed to develop 4000 brake horse-power at a normal speed of from 86 to 87 revolutions per minute. This designed power was obtained on the test bed trial. The unit referred to, which is complete with two three-stage

air compressors and two scavenging pumps mounted at the forward end of the engine and driven from an extension of the crank shaft, will form the first half of a port set of proposed twin-screw machinery. This twin-screw installation would consist of two eight-cylinder motors designed for a total output at sea of 15,000 brake house-power, equal to 19,000 indicated horse-power.

In Figure 2 we reproduce sections showing one of the proposed new engines placed side by side with the starboard set of 20,000 indicated horse-power quadruple-expansion steam engines, which were built at Clydebank for the Cunard liner *Caronia* and which today are continuing to work as satisfactorily as ever. It is interesting to note that a similar piston speed

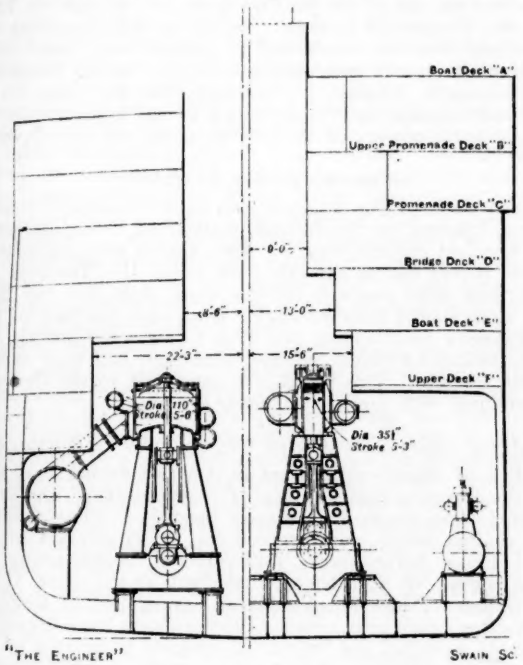

FIG. 2—STEAM AND OIL ENGINES COMPARED

to that employed on the *Caronia's* engines is proposed for the new large-power Brown-Sulzer engines. The set we illustrate is of particular importance, as it brings up the power of the two-stroke, single-acting engine to that which is required for a twin screw machinery installation for a large passenger liner. The engine we have referred to was designed and constructed by John Brown and Company, Limited, in connection with Sulzer Brothers, of Winterthur.

The firm of Mirrlees, Brickerton and Day, Limited, has for many years occupied a leading position as regards Diesel engines for land use, marine auxiliaries, and industrial work, and it is not surprising that during the year it turned its attention to engines of large power, which are now also available for marine work. The new type of 1000 brake horse-power reversible Mirrlees-Nobel engine, which was recently completed and tested, embodies the long experience of the Nobel firm, but in the design have been incorp-

orated many of the standard features of the Mirrlees engine. It is a four-cylinder model with a cylinder diameter of 22 inches and a stroke of 29½ inches, and its designed speed is 125 revolutions per minute. With six cylinders powers up to 1500 brake horse-power can be obtained. In order to reduce the engine length the scavenging air pumps are placed behind the main columns and are link-driven, but they may equally well be placed in line with the main cylinder when space permits. The interlocked reversing controls are placed at the center of the engine and the reversing operations from full speed ahead to full speed astern can be performed very quickly.

The "Neptune" type of marine engine built by Swan, Hunter and Wigham Richardson, Limited, was installed in several ships.

Shortly before the end of the year we were able to visit the Blue Funnel Line motor ship *Dolius* and to inspect her Scott-Still propelling machinery, which throughout the year continued to operate very satisfactorily with notable absence of repairs and upkeep charges. Scott's Shipbuilding and Engineering Company, Limited, of Greenock, has now been instructed by Alfred Holt and Company to proceed with a second ship in which machinery of 5000 brake horse-power, or double the power of the *Dolius*, will be installed.

Opposed Piston Engines

The opposed-piston engine designed and constructed by William Doxford and Company, Limited, of Sunderland, maintained its reputation for good service and low fuel consumption, and four vessels were equipped with this type of prime mover during the year—see Table II. Towards the end of November orders were received for six more ships for the Silver Line, which order alone should keep the engine shops busy for part of the present year. At Palmer's Shipbuilding and Iron Company, Limited, another set of Palmer Camellaird-Fullagar engines were built and were erected in the tanker *British Chemist*. This vessel is a sister ship to the *British Aviator*, which was engined with similar machinery last year.

Motor Ships and Marine Oil Engines in America

The building of marine old engines in America during 1925 was largely affected by the Shipping Board policy of "Dieselization," and several ships were converted from steam to oil-engine operation. Outstanding amongst the various engines which were ordered for the conversion of steamships is the 2900 brake horse-power, four-cylinder, double-acting, two-cycle Worthington engine. It was designed and built at the Snow Holly Works of the Worthington Pump and Machinery Corporation at Buffalo and has passed satisfactory bench tests. Each of the cylinders has a bore of 28 inches with a stroke of 40 inches and the unit is designed to develop its full power of 90 revolutions per minute. Several new constructional features are embodied in the design, and the weight of the engine is low for its power, being about 214 pounds per brake horse-power. It is probable that this type of marine engine will eventually be built in England by Worthington-Simpson Company, Limited. Another interesting engine was tested during the latter part of the year at the yard of the Sun Shipbuilding Company, Limited, Chester, Pennsylvania. It is a constant-pressure engine of the Smith-Whaley type and has an output of 750 brake horse-power with a weight, it is said, of only about 33 tons; very little is known, however, of its performance. The same builders carried out several conversion jobs with Sun-Doxford engines. Among the other machinery completed and installed in America during 1925, and there were not more than for or five sets, were two installations of American-Werkspoor engines and two with Ingersoll-Rand-Price type engines with electric transmission. In the Price engine two impinging fuel sprays are employed with a watercooled combustion head and the engine works on the four-stroke cycle. Ingersoll-Rand engines of this type are to be built at Carels' factory in Ghent, Belgium.

Continental Progress in 1925

Although most of the developments on the continent were to some extent reflected in British practice, some of the more interesting ships and engines built and laid down may be passed in review. In Denmark, Burmeister and Wain built eight cargo ships and two passenger ships, some of which were fitted with supercharged engines. A notable vessel was the *Parkeston* for the Harwich-Esbjerg mail service of the United Steamship Company, of Copenhagen. This vessel is engined with twin-screw high-speed trunk piston pattern motors and supercharging blowers are fitted. So successful has she proved that a sister ship has been ordered. Considerable interest centered, of course, around the double-acting engines built for the Swedish-American liner *Gripsholm*, to which we have already referred. In Sweden the Götaverken of Gothenburg, completed five ships and a total of thirty-two engines, including auxiliaries. It is reported that the Götaverken is to construct and engine a sister ship to the *Gripsholm*. In Holland, the Werkspoor works engined two tankers, the *Nordanger* and *Varanger*, which were built by the Netherland Shipbuilding Company, of Amsterdam. In each ship two 1800 brake horse-power motors were installed. Several sets of double-acting, four-cycle Werkspoor engines were begun for the Anglo-Saxon Petroleum Company's tankers. At the Royal "De Schelde" works at Flushing four Schelde-Sulzer motors were completed, two of which will be placed in the Rotterdam Lloyd 10,771-ton liner *Indrapoera*. The Fijenoord Company, of Rotterdam, completed and engined the tanker *Katendrecht* with a single-cylinder, four-cycle M.A.N. engine of 1850 brake horse-power. During the year arrangements were made to fit a 900 brake horse-power Burgerhout-Nobel engine into a British ship.

Considerable progress was made in Germany, and upwards of thirty motor ships were completed. They include vessels engined with standard A.E.G.-Burmeister and Wain type of engines, Krupp motors, and M.A.N. engines, both of the two-cycle, single-acting and two-cycle, double-acting types. We are given to understand that above 1800 brake horse-power the double-acting, two-cycle motor presents advantageous features both as regards size and cost. Already one vessel, the *Altmark*, has been fitted with a three-cylinder engine of this type with 27 9/16-inch cylinders and a stroke of 47¼ inches, designed to develop 2000 brake horse-power at 78 revolutions per minute. Over ten engines of this type are under construction, two six-cylinder units at 4000 and 4400 brake horse-power capacity respectively having been completed. A high-powered engine of the same type is the 15,000 brake horse-power nine-cylinder unit with a bore of 33 13/16 inches and a stroke of 47¼ inches, which Blohm and Voss, of Hamburg, has completed for the Hamburg electricity works. An interesting German ship of the year was the *Duisburg*, which was built by Vulcan, of Hamburg, for the German-Australian and Kosmos Lines. She is a 448 foot cargo ship with a deadweight carrying capacity of about 9,000 tons and is fitted with twin-screw, four cycle M.A.N. motors designed for an output of 4,000 shaft horse-power at a speed of 210 revolutions per minute. This engine speed is reduced to a normal propeller speed of 79 revolutions by a hydraulic coupling and the mechanical reduction gear. Such an arrangement is claimed to give considerable flexibility, quick reversing and a transmission efficiency of about 97.5 per cent. At the meetings of the German Institution of Naval Architects, which were held in Hamburg in November, Dr. Bauer gave an interesting paper on the hydro-mechanical drive, in which the results obtained from the *Duisberg* and her sister ship, the *Altenfels*, were discussed. Incidentally it may be mentioned that the new Beardmore-Tosi double-acting engine will be tested along with a transmission drive of this type. Other developments in Germany during the past year included experiments with superchargers and outputs of engine have been increased from 10 to 20 per cent by the employment of such means.

Probably there is no country today which is further advanced in its program of motor ship construction than is Italy. In all about seven Italian motor ships were completed during 1925, and they include two large passenger ships. Engines of the Tosi type, Fiat motors, and Italian-built Burmeister and Wain type motors were constructed. Indeed the shops of the Stabilimento Tecnico Triestino are particularly well equipped for the production of standard type B. and W. engines. At this yard the large Consulich liners for service between Naples and New York are being constructed. The *Saturnia* and *Urania,* for so these liners are named, will have a length of about 630 feet with a breadth of 79 feet 6 inches and a depth of 45 feet. Their gross tonnage will be about 23,500 tons and the total shaft horse-power 18,000. Super charging blowers are to be employed. The vessels are to be funnelless and runways are to be provided to carry four seaplanes, which will be used experimentally at first to save time on the voyage for both passengers and special mails. At the Fiat works in Turin a new type of two-cycle, single-acting engine was built and in its construction cast steel was largely employed. It is also understood that a large double-acting, two-cycle engine of 2,000 brake horse-power per cylinder is under construction at these works. During the year an order was placed by the Navigazione Generale Italiana, of Genoa, for a 30,000 gross ton motor passenger liner *Augustus,* which will be built at the Ansaldo, Sestri Ponenti Yard, Genoa. This vessel, which, when completed, will be the largest motor liner in the world, will have four M.A.N. type double-acting, two-cycle engines. Each engine is to give 6,250 brake horse-power continuous output at 120 revolutions per minute and will be a six-cylinder unit with 27⅝-inch bore cylinders and a stroke of 47¼ inches. The total shaft horse-power will thus be at normal speed 25,000 or 28,000 maximum, at 125 revolutions per minute. The scavenging blowers and electric generators, aggregating 4,750 brake horse-power, will be installed in a separate auxiliary engine-room. The hull of the ship is practically identical with that of the steam turbine vessel *Roma,* now under construction at the Ansaldo yard.

Conclusion

From the necessarily short review of the progress made in 1925 in motor ship building and the marine oil engine industry it will be seen that considerable development took place. Whereas early in 1924 the largest size of cylinder built—apart from single-cylinder experimental engines—was only 29-inch or 30-inch, last year, cylinders of 33-inch and 35½-inch were built and tested in actual engines. This means that engines of double the horse-power per shaft that was attainable two years ago can now be installed, and there is practically no limit to the field of application of the marine oil engine. The past year saw new types of engines evolved and improvements made to auxiliary plant and we are in no doubt that the motor ship will prove perhaps the most important factor in the revival of the British shipbuilding industry.

Amateur Wins Radio Prize

New York Times, 19 January, 1926.—Frank Conrad of Pittsburgh, who, as a radio amateur a few years ago, was the first to investigate the possibilities of radio signalling at what was then considered extremely high frequencies, received a prize of $500 from the Institute of Radio Engineers yesterday at the opening of its first convention in the Engineering Societies Building, 37 West Thirty-ninth Street. The prize consisted of a year's income from a $10,000 fund created by Morris Liebmann, to be awarded "for the best contribution to the advancement of radio during the past year or in recent years."

Dr. H. J. Dellinger, retiring President of the Institute, said the prize was "a tribute to the amateur and his pioneering spirit." Mr. Conrad's work, he declared, constituted "the most important step since the discovery of radio itself, because upon it rests the whole structure of present-day broadcasting."

From his amateur experimenting, Mr. Conrad went to the Westinghouse Company in Pittsburgh, where he had charge of the erection of KDKA, said to be the first broadcasting station in the world.

Only two great problems remained in radio today, Dr. Dellinger told the 500 delegates. They were the perfection of broadcasting and "the solution of the mystery of wave phenomena."

Working toward the latter, Greenleaf W. Pickard, consulting radio engineer, in a paper on "Polarization of Radio Waves," outlined experiments which indicated that the direction of waves as obtained by radio compass could not be relied upon.

A framed testimony in appreciation of his work in radio was presented to Dr. Alfred M. Goldsmith, Chief Research Engineer of the Radio Corporation of America.

Donald McNicol, recently elected President of the Institute, said during the evening session that "the present demand for radio channels far exceeds the present available channels. The ether, like the ocean, is there to be used, and the engineer's task is to invent and develop carriers which may traverse the element independently, safely and without causing damage to each other.

Other newly elected officers announced for the first time were Dr. Ralph Bown, vice president; Dr. J. H. Dellinger, junior post president; Dr. A. N. Goldsmith, secretary, and W. F. Hubley, treasurer.

Short Waves Sent by Low Power Stations in California Cover 8,000 Miles

New York Times, 31 January, 1926.—Radio communications 8,000 miles by daylight or 16,000 miles through darkness is the distance record achieved by two California radio amateurs. The first one, Brandon Wentworth, at Palo Alto, established two-way communication with British station 2SZ, Mill Hill School, London.

While Wentworth's station, 6OI, is making records, a fellow-member of the League, Colonel Clair Foster of Carmel, California, is putting his signals over the same route and copying British signals with a regularity that has decided him to try working England on a regular schedule.

By a peculiar coincidence, the signals of each California station furnish a check for the other. Wentworth accomplished his first two-way contact at about 7:45 A.M., the same time that Colonel Foster worked. The distance eastward is about 8,000 miles, and this is all through daylight at that time of day. The westward distance is in the vicinity of 16,000 miles, partly through daylight and partly through darkness.

Experts who have reviewed the respective records are inclined to think that the signals traveled westward over the longer route, since at the time Colonel Foster's station was being copied in England signals from station 1HR, owned and operated by Lieutenant H. P. Roberts at Fort McKinley, Rizal, Philippine Islands, was heard by the British amateurs with a considerable greater signal strength.

These two amateurs are not limiting their efforts to England. Colonel Foster carries on a regular schedule with station 2BG in India, owned and operated by G. W. G. Benzie at Udarband, Province of Cachar, and with NGY, the radio station aboard the U. S. S. *Helena* in China.

Wentworth has worked in the other direction, achieving great distance in communicating with naval craft. He successfully worked with station

NTT, the short-wave radio station aboard the U. S. S. *Scorpion*, when that craft was at anchor in the harbor of Trieste, Italy. In this he was the first California amateur to work Italy or any of the territory near by.

Wentworth has also been successful in establishing two-way communication with South Africa, establishing contact with station O-A3B, located at Durban. The South African station reported that it was using a 250-watt tube, working on a wave length of 35.5 meters.

Wentworth's station is using a 50-watt tube with an output of 200 watts.

MERCHANT MARINE

American Shipping in 1925

The Nautical Gazette, 2 January, 1926.—For private shipowners the past year has not entirely fulfilled the promise of its drawing. In some respects 1925 has been a period of disappointment, for many of the expectations for better times expressed last January have failed to materialize. Yet when the shipping history of 1925 is told, it will be found to have been a better year than 1924. Cargoes have been more plentiful, rates have been steadier and the year has passed without experiencing the disturbances of devastating rate wars. The economic recovery and political stabilization of Europe were not effected completely nor early enough in the year to have the anticipated beneficial influence upon the cargo movements. Here and there throughout the year there have been adjustments and agreements made, and these have resulted in perceptible improvements in the world's freight situation, but the real factor in the restoration of the world's trade, the Locarno Treaty, was executed too late in the year to show results in 1925. The year closed, however, with the spirit of Locarno resting upon the nations of Europe and with the world standing at the threshold of a new era of commercial prosperity, international good will and political peace. Although the financial results of their year's business is far from satisfactory, and their 1925 balance sheets will show little or no profit, shipping men, nevertheless, have much to be thankful for in the signing of the Locarno Treaty, the real benefits of which will be felt by them in 1926 and the years following. The world is still feeling the depressing effect of a large volume of idle tonnage, and the struggle for shipping prosperity will be a hard one until all this tonnage is either scrapped or absorbed into trade, but there has been a decrease in the number of idle ships during the past year and the situation is nowhere near as acute as it was in 1924. Europe has been disturbed by strikes, unemployment is still at a high figure, and these factors have had an adverse influence on shipping, but although their 1925 balance sheets may not turn out to be as favorable as they had hoped earlier in the year, shipping men have a valuable invisible asset in the spirit of Locarno, which should form the basis for real encouragement and renewed hopefulness.

The year 1925 has not been a prosperous one for shipbuilders. The shipbuilding industry is still in a state of depression and yards have accepted what few contracts have been offered more for the purpose of keeping their plants running and their organizations together, rather than from any hope of showing profits. Costs of labor and material are still high enough to keep up the cost of ship construction, and shipowners have been reluctant to place orders for new tonnage. The past year has been marked by the awarding of the contract for the commencement of construction of the largest and fastest merchant ship ever built in the United States. This is the passenger liner *Malolo*, being built for the Matson Navigation Company by the William Cramp and Sons Ship and Engine Building Company of Philadelphia, the launching of which this year will write a new chapter in the history of American shipbuilding. The Inter-

national Mercantile Marine Company has also awarded the contract for the construction of a large liner for its Panama Pacific Line to the Newport News Shipbuilding and Dry Dock Company. These two vessels will be the culmination of American merchant shipbuilding art. The past year has also seen a tremendous increase in the construction of motorships, and for the first time in the history of the world the volume of motorships under construction in the first quarter of 1925 equalled the volume of steamers under construction in the world. Several American builders of Diesel engines have been busy building engines for installation in fourteen Shipping Board vessels which are being converted from steamers to motorships. It is about fifteen months ago since the contracts for these engines were awarded and we had expected to see the installations completed and the converted ships placed in service last year, but there has been some delay and the New Year opens without a single installation completed and without a single converted ship in service. This is a big disappointment, for the American merchant marine needs these motorships and it is to be hoped that the early part of this year will see the first stage of this conversion program executed.

American Foreign Trade Review and Prospects

By Julius Klein, Director, United States Bureau of Foreign and Domestic Commerce, *The Nautical Gazette*, 9 January, 1926.—The year 1925 closed with our foreign trade in a highly satisfactory situation. Unless unforeseen causes should arise drastically affecting either our own production or the purchasing power of our leading foreign markets, the prospects for the coming year are altogether favorable.

Foremost, perhaps, among the factors which promise favor to our foreign trade for the coming year is what has already come to be known as "the spirit of Locarno" in the countries of Europe that are among our best customers. No review of the past year would be complete without mention of the Treaties of Locarno, whereby the principal nations of Western and Central Europe pledged themselves to mutual guarantees of peace, stability, and good will. We have reason to hope that a new era has been thus invoked among the former warring nations, and to believe that Europe is at last about to enter into a period offering the most beneficent opportunities for her undisturbed internal development. Restored to a reasonable sense of national stability and the opportunity for greater industrial productivity, Europe must undoubtedly find herself with an increased ability to buy from abroad; and it can hardly be doubted that American trade will have its appropriate share in Europe's improved markets.

During 1925 the export trade of the United States continued its steady advance, exceeding by more than 7 per cent its value in 1924. The total value of our exports for the year is in the neighborhood of $4,900,000,000, the largest figure since 1920, and representing an increase largely due to increased volume rather than to higher prices. This is an eminently satisfactory showing when compared with that of other leading industrial countries. British exports of domestic products were slightly less than in 1924, and french exports also showed a decline. Very natudally those of Germany, in view of the reestablishment of her currency and the at least partial settlement of international complications, have shown some increase—about 6 per cent. After allowing for the changing prices, British exports are only about three-fourths as great as before the war, and German exports a little more than one-half as great, while French exports, as nearly as can be ascertained, have increased slightly. Those of the United States, on the other hand, show a large increase in physical volume—at least 20 per cent.

It is particularly a matter for comment that our exports of finished manufactures have again risen markedly. Almost every class of manu-

factured articles has been exported in greater quantity than ever before, except in the inflation years, 1919-20. A truly remarkable achievement of American industry is its increase of nearly 60 per cent over 1924 in the number of automobiles exported, raising the automobile to a rank in our export trade surpassed only by cotton and mineral oils.

But our so-called favorable trade balance, that is the excess of exports over imports, has been about one-third less than last year. This is due, in large part at least, to perfectly normal and healthy conditions. When our business is active and the people prosperous, we demand more exotic foodstuffs on our dining tables and more raw materials from abroad for our factories. The year 1921, which was one of marked depression, for example, showed much smaller imports and a much larger excess of exports over imports than in the years since. The year 1925 was marked by greater prosperity than 1924. As against an increase of a little over 7 per cent in our exports, imports have increased by 17 per cent in 1925. This disparity need be lamented only because of the fact that fully half of the increase in value of imports has been due to price advances.

It should be borne in mind that since pre-war years the United States has changed from being primarily a debtor country to being a creditor country, toward which interest payments and payments on principal flow, tending to increase the imports. Moreover, we now have to pay relatively much less to foreigners for ocean transportation on account of the development of our own shipping. Were we not constantly making large new investments in foreign countries, the change in our position in this respect might readily result in a normal excess of imports. The continuous large balance in our favor represents primarily our increasing loans and investments abroad. Our new placements of capital in foreign countries during 1925 have probably totaled more than $1,000,000,000 and bring our foreign investments (exclusive of loans by our Government) to more than $9,000,000,000, as compared with about $2,000,000,000,000 before the war. These investments represent, of course, savings of the American people and additions to their wealth; they supply a future increase of national income in the form of interest and dividends from such investments, as well as a most potent stimulus to our exports.

The exports of 1925 show, as compared with 1924, an increase of about 13 per cent in the value of crude materials, a slight decrease in foodstuffs, and an increase of about 12 per cent each in semi-manufactured and finshed articles. The increase in crude materials would have been still greater but for the decline in the price of cotton, the most important item. Owing to the marked improvement in our last two crops, our cotton exports were more than 40 per cent greater in quantity in 1925 than in 1924; but the increase in value has been around 25 per cent. The principal individual foodstuffs exports declined materially in quantity, but owing to higher prices show much less decrease in value. Exports of wheat and flour, for example, have been about one-third less in quantity than in 1924.

Particularly gratifying is the showing of our exports in most of the major classes of manufactured goods. The increase of nearly 60 per cent in the number of automobiles exported has already been mentioned, and every indication is that this remarkable advance will continue—largely because of the general improvement of the world economic conditions, the lowered prices of our automobiles, the inability of most European producers to satisfy demand, and the exploitation of hitherto undeveloped markets, stimulated in several important instances by the United States Department of Commerce. Outstanding examples of increased purchases of American automobiles in 1925 over 1924 are: Belgium, 36 per cent; Denmark, 700 per cent; Norway, 30 per cent; Brazil, 154 per cent, and United Kingdom, 260 per cent.

Exports of machinery (other than electrical and agricultural), have increased in value more than 20 per cent, and those of agricultural machinery more than 25 per cent. Exports of electrical machinery, in contrast with the normal increase of recent years, have been stationary. The increase of recent years in exports of copper was continued during 1925, stimulated by the further recovery of Europe and the effort there to make up for deficient electrical development during the war years. Our exports of rubber tires increased about one-third in quantity, again a commodity to which the Department of Commerce has been giving some special attention. Those of cotton manufactures, which had fallen off somewhat in 1924, again arose materially. In fact, the only important class of manufactured articles to fall off in exportation are lumber, and iron and steel. The decrease in iron and steel is comparatively insignificant, and is the natural result of a gradual recovery of European production and of the severe competition of countries like Germany, Belgium, and France with much lower wage scales—in the case of the two latter countries—with a temporary stimulus to exportation resulting from currency depreciation.

Our exports to every continent, except Asia, were greater in 1925 than the year before. On account of the diminishing buying power of Cuba, however, resulting from the fall in sugar prices, and of Canada's poor harvests in 1924, our exports to North American countries showed but a small increase. In Asia the decrease is confined substantially to Japan and China, but even so our sales to the Continent of Asia in 1925 was not far short of four times as great in value as they were in 1913. In the case of Japan, the decline in our exports is attributable to the naturally reduced demands for reconstruction material, and to a general business depression that has been felt there; but the outlook for 1926 in the Island Empire is more encouraging. Disturbed political conditions in China have seriously hampered our exports to that country, and the trade prospect there fore 1926 is still uncertain, but we should at least equal this year's trade. Our exports to India increased slightly in spite of falling price-levels and of British, German, and Japanese competition. Americans are steadily gaining a foothold in this market. Exports to both Australia and New Zealand show an increase despite greater competition from Europe, and totaled in 1925 more than three and a half times those in 1913. And likewise, in the face of keener competition from both Europe and Japan, we made fairly large gains in our exports to Malaysia. The buying power of the Malay region is being much enlarged by the high prices of rubber and tin.

As has been so frequently the case in recent years, our exports to South America show a marked increase, being more than 20 per cent greater than for the previous year, and our products in the markets of that Continent can only be regarded as most gratifying. Improved world trade stability and a much enhanced demand in European markets for Latin-American products, have brought about more prosperous conditions in the countries of Latin America. This has been reflected in their increased purchases of our manufactured products during 1925.

Exports to Europe consist very largely of foodstuffs and raw materials, and they have shown an increase of about 14 per cent in value in 1925. Exports to Russia increased over 50 per cent, cotton being the dominant items; those to the United Kingdom by 9 per cent. The improvement in the economic situation of Germany is reflected by an increase of nearly 20 per cent in our exports to that country. Increasingly stabilized conditions, both political and economic, and restored opportunities for the reorganization of productive industries after the disorders following in the wake of the war are doubtless the main reasons for the steady growth of our trade in European markets.

Turning now to imports, the total value of our import trade in 1925 increased even more than that of exports, being about 17 per cent greater

than in 1924. While this increase reflects the greater prosperity of the country with enhanced buying power for tropical and semi-tropical foodstuffs and exotic raw materials, it is unfortunately attributable also in considerable part to marked advances in the prices of a number of important articles; such as rubber, coffee, tin, wool, and hides and skins; and some of these increases in turn are due to indefensible artificial restrictions directed against the consumers of the United States. The most striking phenomenon in our import trade of 1925 has been the great advance in the price of rubber, raising it, as in all probability the final figures will show, to first place among our imports. For the first ten months the quantity of rubber imported increased by 19 per cent over the corresponding period of 1924, but the value increased 121 per cent. During recent months the average import price has been much more than double that for the corresponding months of 1924. Had rubber remained unchanged in price, the total value of our imports would have increased but 11 per cent instead of 17 per cent. This immense rise in the price of rubber has been at least in part due to artificial restrictions, the serious character of which Secretary Hoover has recently called to the general attention of the public.

Another considerable fraction of the increase in value of imports has been due to the higher price of coffee. While the quantity imported has been about one-sixth greater, indicating an increase of about one-third in price. This rise is largely attributed to artificial control. There was also a marked advance in the average prices of other major import items—wool, tin, petroleum, burlaps, and hides and skins. These various increases were only in part offset by certain price declines, the most noteworthy of which was the fall of more than 35 per cent in the price of sugar, bringing that item down from first to fourth rank among our imports.

Among the five great classes of imports, the only one to show a decrease in 1925 was manufactured foodstuffs, and this was wholly attributable to the lower price of sugar. Crude foodstuffs increased by 15 per cent, being materially swelled by the higher price of coffee. Imports of crude materials have tended to grow year by year since 1921, but the increase in 1925, no less than 38 per cent, was materially accentuated by advance in prices. Imports of semi-manufactured goods rose by 17 per cent, but those of finished manufactures, which have long tended to become a smaller proportion of the total, increased by only 5 per cent.

The high buying power of the United States in 1925 is indicated by the fact that most of the major individual articles of import increased quantitatively even when higher prices had to be paid for them. Increases, in most cases exceeding 10 per cent, and in several exceeding 25 per cent, appeared in silk, sugar, rubber, wool, paper, furs, hides and skins, wood pulp, tobacco, tin, fertilizers, burlaps vegetableoils and lumber. A conspicuous decline in flaxseed imports has taken place during the last two years as the result of marked increase in production in this country.

Our imports from Oceania in 1925 showed an increase of nearly 60 per cent. Those from Asia rose nearly 40 per cent, advancing this continent to first place among our sources of supply. These great increases, however, were in no small part due to higher prices of articles from these countries. The slight decrease in our imports from North America is more than explained by the lower price of sugar. Imports from South America and Europe each rose by about 13 per cent.

The experience of 1925 has thus been highly encouraging with respect to the competitive ability of the United States in the export of commodities —particularly those in which efficiency and enterprise on the part of producers and traders is able to bring results—while the increase of imports likewise furnishes ground for gratification. But the experiences of the year have also emphasized the necessity for giving careful attention to securing the goods we need from abroad at reasonable prices. Although

the United States is more nearly self-sufficient than any other important country, the maintenance of its high standard of living demands large importation of a number of exotic commodities. In some of these our consumption constitutes half or more of the total world consumption. There has consequently developed in a number of foreign countries a tendency to impose artificial restrictions in order to enhance the price which must be paid by the United States. This country itself has always refrained from any governmental measures aiming to enhance the prices of its exports; on the contrary it has a vigorous legislation to prevent its citizens from doing so. The question of measures to combat these exactions deserves prompt and earnest consideration.

Increase in American Foreign Trade

The Nautical Gazette, 2 January, 1926.—American imports for the year just ended promise to exceed four billion dollars in value, as indicated in figures now available, says the Foreign Commerce Department of the Chamber of Commerce of the United States. In an import analysis just issued it is pointed out that nine months' imports last year have exceeded by 15 per cent the figures for the same period in 1924 and that they were larger than for any full twelve months previous to 1919.

The general trend of imports since 1920 has been decidedly upward, and during the last twenty-one months the gain of imports in relation to exports has been more noticeable than before. A statement setting forth the important features in import trade during the first nine months of the year follows:

Heavy receipts or high values established records or near-records among several of the leading commodities. Imports of raw silk set a new record in quantity imported—45,822,000 pounds, and its value—$281,000,000—was exceeded only in 1923. The spectacular rise in the price of crude rubber, coupled with increased American demand, established new records for that commodity in both quantity and value.

The value, $258,000,000, for nine months of 1925 has not been equaled by that of any full year, and the quantity, 637,000,000 pounds, has never been equaled in any previous nine months period. For the period rubber stood in second place in our list of imports, displacing sugar.

Imports of cane sugar were the greatest in quantity, seven and one-third billion pounds, ever received in the United States in a 9-month period with one exception—1922. Despite the low price, its value, $211,000,000, has been exceeded only four times—in 1919, 1920, 1923, and 1924.

We began drinking more than a billion pounds of coffee a year in 1914. Since then our consumption has kept well above that mark even in the face of higher prices. The quantity imported during the first three quarters of 1925, falling off somewhat from 1924 to 928,000,000 pounds, was exceeded in 1917, 1919, 1920, 1921, 1923, and 1924, but the value $209,000,000, was surpassed only once, in 1920.

Furs are in demand. In nine months of 1925 we imported 127,886,000 fur skins valued at $87,122,000—figures never reached before, so far as the records show.

Every large group of imports, with the single exception of vegetable foodstuffs, was greater in value for the nine months of 1925 than the same period of 1924. The value of animal products (meats, dairy products, fish, hides, furs, and so forth) increased 28 per cent; rubber, tobacco, and naval stores increased 62 per cent; textiles, led by silk and wool, increased 24 per cent; wood and paper 9 per cent; coal, petroleum and other non-metallic minerals, 5 per cent; metals, led by iron and steel, 9 per cent; machinery and vehicles 5 per cent; and chemicals 22 per cent. Owing chiefly to the decline in grain imports, the vegetable foodstuffs group decreased 3 per cent.

The increased value of our imports over last year reflect higher prices for a very large proportion of the commodities brought in, although the quantities in most lines were substantially larger than for the same period of 1924. Few articles were cheaper than in 1924. Out of 44 principal imported commodities only eight were lower in price. These were raw silk, sugar, newsprint paper, wood pulp, leaf tobacco, nitrate of soda, other fertilizers, cotton laces, and embroideries.

Comparison of the volume and value figures for the first nine months of 1925 with those for the same part of 1924 shows many substantial increases; and few severe declines. Raw silk imports increased 11,433,000 pounds, or 33 per cent in quantity, and $53,077,000 in value, or 23 per cent. Crude rubber gained 123,000,000 pounds, or 24 per cent; and $139,000,000 or 117 per cent. While sugar imports were 308,000,000 pounds, or 4 per cent greater, the low price brought the value down by $105,644,000, or 33 per cent. Coffee imports declined 125,000,000 pounds, or 12 per cent in volume, but the heavy price increase from 17½ to 22½ cents a pound in Brazil more than offset the decline. The gain in value was $35,000,000, or 20 per cent. Unmanufactured wood imports increased 63,872,000 pounds, or 31 per cent, and $48,261,000, or 71 per cent in value. Imports of furs increased in number by 19,200,000, or 18 per cent, and $24,182,000, or 38 per cent in value. Raw hides and skins increased 31,864,0000 pounds, or 12 per cent. in quantity and $23,030,000, or 42 per cent in value. Imports of standard newsprint paper were 102,000,000 pounds, or 5 per cent larger in quantity and 152,000, or two-tenths of 1 per cent. Receipts of tin bars, blocks, and pigs were heavy, with an increase in quantity of 15,870,000 pounds, or 14 per cent, and in value $17,603,000, or 33 per cent. Imports of burlaps were 31,149,000 pounds, or 7 per cent greater in quantity, and $20,603,000, or 46 per cent in value.

Imports of wood pulp increased 16 per cent in quantity and 13 per cent in value, the price being lower. Crude petroleum imports fell off 20 per cent in quantity but increased 4 per cent in value. Receipts of leaf tobacco were 13 per cent larger, but the price declined 6 per cent.

Exports of the United States for the first nine months of this year were greater than those of any full year before 1916, according to the report.

The report points out that "total exports for the first nine months of 1925 amounted to three and one-half billion dollars, which averages 389 million dollars monthly. This is 12 per cent greater than a year ago.

"When the figures for the best months of the year, October, November, and December, become available, the value of our exports for 1925 will be close to five billion dollars—a figure reached only in the war and post-war years of 1916 to 1920. Since 1920 the general trend of exports has been upward, with the tendency since December, 1923, more sharply upward than heretofore.

"In 1925 there was the normal seasonal slowing up, which lasted from May through July, when the usual late summer and fall activity began with the exportation of cotton and other agricultural products.

"High levels, which in some cases constituted new records, were reached in both quantity and value by some of our leading exports. Shipments of raw cotton for the January-September period of 1925 totaled more than two and one-half billion pounds, nearing the high figure of 1912, the year of our second greatest crop. In value our cotton exports were exceeded only by the high-priced cotton for 1919 and 1920, when raw cotton topped 40 cents. In the light of the high cotton production figures for the crop now being ginned, the prospects for cotton exports for the last quarter promise to bring the year's total up to heights well above a billion dollars.

"Records were made in automobile exports, with shipments of 218,471 cars and chassis, valued at $162,090,000, figures never equaled in volume or

value. Wherever the American automobile goes, there we find American gasoline. Exports of gasoline, naphtha, and other light products also exceeded those of all previous nine-month periods, with total shipments of 937,000,000 gallons, valued at $147,000,000.

"Exports or refined copper for the first three-quarters of 1925 amounted to 789,000,000 pounds, only about 200 tons smaller than the record shipments in 1917. The value, $114,000,000, was exceeded only by the war values of 1916-1918.

"Nearly every important group of exports showed increased values over the 1924 figures. Meat exports increased 2.4 per cent; grains, 35 per cent; raw textile fibers, 20 per cent; manufactured textiles, 18 per cent; paper, 5 per cent; coal, coke and petroleum, 3 per cent; copper, lead and zinc, 24 per cent; machinery, 19 per cent; vehicles, 41 per cent; and chemicals, 9.6 per cent; miscellaneous vegetable products (tobacco, rubber, and naval stores), were off 7.4 per cent; lumber was off only 1 per cent, and iron and steel were off 2.6 per cent.

"The increased value of exports was due in large measure to higher prices on many products, notably grain, pork products, gasoline, and metals.

"Exports of raw cotton increased 20 per cent in value and 43 per cent in quantity; automobiles increased 66 per cent in value and 62 per cent in quantity; gasoline, naphtha and other light products increased 13 per cent in value and 4 per cent in quantity; wheat increased 35 per cent in value, but declined 3 per cent in quantity; refined copper increased 13 per cent in value and 7 per cent in quantity. Lard exports were 4 per cent lower in value and 30 per cent off in quantity; leaf tobacco declined 20 per cent in value and 29 per cent in quantity; coal and coke declined 1 per cent in value, but increased in quantity six-tenths of 1 per cent; lubricating oil increased 2 per cent in value, and five per cent in quantity; wheat flour increased 11 per cent in value, but declined 26 per cent in quantity. Exports of rye increased 69 per cent in value, and 25 per cent in quantity; oil- cake and oil-cake meal increased 65 per cent in value and 59 per cent in quantity; barley increased 131 per cent in value and 147 per cent in quantity; brass and bronze increased 79 per cent in value and 117 per cent in quantity; automobile engines increased 387 per cent in value and 642 per cent in quantity; lead pigs and bars increased 94 per cent in value and 56 per cent in quantity, while oats increased 2,776 per cent in value and 3,154 per cent in quantity."

Pacific Mail Ships' Romantic Careers of 77 Years Ended

Washington Post, 17 January, 1926.—San Francisco. (By A. P.).—On a dull November day seventy-seven years ago, a great side-wheel steamer, her decks teeming with hungry, unkempt, but riotously joyous gold seekers, many of them haggard from tropical fever, came through the Golden Gate and anchored in the stream, the first steam vessel to enter this roadstead.

On a sparkling fall day in 1925 a trim freight craft, loaded to the Plimsoll mark with a rich cargo, was warped into a towering dock on the San Francisco water front and spun down the house flag from her main truck for the last time.

These two events marked the beginning and the end of the Pacific Mail Steamship Company, oldest steam water carrier on the continent with the exception of the Cunard, and once credited with being the greatest of the world's ocean transportation companies.

From the time that the *California* paddled into the harbor until the trim *Solana* tied up and handed over her papers to her new owners, the history of this company was spiced with romance and shadowed deep by tragedy.

The *California* put to sea from New York on October 5, 1848, with a happy company bound for New Granada, far to the south where the Americas join, and for the Oregon wilderness. While she was on the way, word came to her that gold had been discovered in California. The news brought on sort of treasure madness to the ship's company. She moved swiftly down the Spanish Main under throbbing boilers until she came to the Isthmus of Panama. There the treasure seekers left her in one eager horde.

Their hope was to get to Panama and catch a boat there which would get them to the new Golconda before the *California* arrived. They drifted up the Chagres river in canoes poled along lazily by the coppery natives who would stop for rest at every shady place. They choked the boulder lined trails that had been blazed out three centuries before by the Spanish conquerors bringing back the treasures of the Incas and the Aztecs. They fell and died of fever and exhaustion when the trails gave way to tangled jungle growth. A few pitiful hundreds reached Panama at last to find no ship there.

Many dropped from the dread Chagres fever while they waited. Other hundreds joined them from other ships. The *California* came in sight at last.

But 400 could get aboard and they packed in 'tween decks, sweating, swearing, but feverish with hope. The others were left behind to await other craft or to die.

A few weeks later the *California*, her galley bare, her coal gone, but her devil-may-care company sustained by their great excitement, paddled into the harbor of San Francisco.

Captain John Marshall, the skipper, who curiously enough bore the name of the discoverer of gold, led one party into the hills and was lost to history. Another who fairly leaped over the *California's* side was William Van Voorhies who later became secretary of the state of California.

The *California* waited and waited in the harbor, but her gold-mad crew never returned. Some historians say that the crew of the second ship of the line, the *Oregon*, was put in chains after her arrival in San Francisco so that it could not yield to the siren call from the "diggin's."

The history of American finance would not be complete without frequent reference to the Pacific Mail. Established in 1847 in New York by William H. Aspinwall and associates on a capitalization of $400,000 and with a mail subsidy of $199,000 annually from the government, it had reached the towering capitalization of $2,000,000 by 1850.

The line was formed to institute a monthly mail service to the new territory opened up by the treaty of peace between Mexico and the United States of April 13, 1848, and vast unexplored Oregon lands made available by the Anglo-American treaty of the same period. The western terminus was to be on Puget sound, but the gold rush blocked that plan and the ships tied up at the rainbow's end in California.

In the late fifties, Commodore Cornelius Vanderbilt offered some lively competition with his steamer line from Nicaragua up the west coast, but trade agreements soon dulled the edge of this opposition.

In 1865, the company by a master stroke broke the English and French monopoly of eastern Asiatic trade by starting a line between San Francisco and Hongkong by way of the Hawaiian islands and Japan, and won an annual mail subsidy of $500,000. By 1867, the company had a fleet of twenty-five big steamers on the waters of two oceans and the commercial mastery of one of those oceans, the Pacific.

The company survived some fourteen stunning disasters to its vessels, the greatest of which, perhaps, was the loss of the steamer *Central America* off the coast of Florida in 1857.

The *Central America* buckled up in a storm, with the loss of 419 of her 582 passengers and crew. Captain Herndon, famed Amazon explorer,

who was master, went down with his ship. In the same year the steamer *Columbia* was lost in the China sea.

The company's ships also made vivid history of another sort. The *Mongolia*, big passenger liner, was credited with being the first American vessel to sink a German submarine in the world war, this event happening, however, after she had passed out of the company's hands.

In 1916 the company, hit hard by the wage and other provisions of the seaman's act, sold its big transpacific liners, which had held Pacific trade supremely for a quarter of a century, and substituted three small boats.

Later the company acquired five boats of the *President* type under charter from the government. The sale of these boats to the Dollar Steamship Company a few months ago marked the beginning of the end of the historic old carrier. The route between the Pacific and the Atlantic by way of the Panama canal was maintained for a time, but was finally disposed of, and the company was left with but one steamer, the *Solana*.

Just a few days ago the house flag of the *Solana* came down and the history of the famous American steamship company was at an end.

COMMENTS ON DISARMAMENT CONFERENCE

Mr. Ford's Page, *The Dearborn Independent*, 30 January, 1926.—A peaceful nation is one that has the means to make war and refrains. Until the means are present, disposition toward their misuse cannot be fully known. In the present world the peace-believers confront the war-believers, and fortunately it is the peace-believers who are best armed. They, and no others, give such promises of peace as the League and Locarno may hold. Their power for peace seems to be in proportion to their power to enforce it. It sometimes seems that the course of history has been an effort to produce the invincible warrior, and through him to dominate the world for peace.

All of the peace plans now before the world are based on agreements to go to war. The advantage which it is hoped will accrue to peace is based on the assumption that if all possible future military line-ups are known in advance, no one will have the temerity to start a war. It is said, for example, that the last war (that is, the last but four or five: meaning the one which broke out in 1914) would not have occurred if Germany had known that Britain would help France. As if Germany did not know.

The League of Nations as a peace influence rests upon the presumption that it could use the force of its members to subdue any rebellious member or non-member nation. When, however, it was sought to make this presumption an explicit arrangement by which certain forces, the British fleet, for example, would be practically under the direction of the League as a sort of Super-State, the attempt fell through.

The Locarno treaty is really a war treaty, binding Great Britain to go to the aid of one of several nations in the event of their being attacked by another. That is, the war armament of Britain is taken as the guaranty that certain other nations need not arm to the teeth because British force would be obliged, under the terms of the treaty, to be at their disposal in case of attack. A Locarno treaty signed by nations equal as to military power, with no powerful Britain to throw into the scale, would mean much less to the world. It is British military power that gives it weight.

The world has yet to see how much stress any of these arrangements will bear. They have not been tested as yet. But there is no inherent need for their failing.

What the peace-loving forces of the world are facing is the war-loving forces. If that fact could be realized, much waste motion would be saved. The professional pacifist misleads (usually in utter innocence), his or her followers by giving the impression that the world is just thirsting for

peace, and that wicked powers like the United States will not permit it to have peace. Hence, they say, disarm the United States!

Only the most delightful fairy-tale credulity can avoid seeing that, as for peace, only certain peoples believe in it as *desirable*, and only such can believe in it as *possible*. There are other peoples who believe that war is above all things a biological necessity, and therefore desirable, and that what we call peace is but an interval between wars. As some one has said, peace time is a period when nations wage war through diplomats. But there are peoples who seem racially fated to the belief in war and for them it may have the force of a biological necessity. It is not, however, to these races that we belong; we are not the war-believers. The attitude of our people is that war is an evil against which we must protect ourselves, by preventing it if we can, by defeating it if we must.

A nation's will to peace can only be judged by its abstinence from provocative actions. It may have been in war frequently, but not have provoked war. An honest editor or official may be a storm-center in his community without being a belligerent man. In a choice between dishonor and strife, he is compelled to strive. Yet the provocation may have been from evil counsels without.

By this test the nations in which the pacifist propaganda rages strongest are the nations which are most pacific. The war record of the United States has been recently recited to suggest that we are a belligerent and provocative nation. There are now living the veterans of three wars, each of which was fought in defense of a moral principle. The fact that slavery was involved in one worse than slavery in the other, and world democracy in the third, gives a caste to these wars—none of which was ours to begin—which requires a different definition than when European wars are meant.

That, then, suggests the problem of the world: how the peace-believing nations can inoculate with their belief, or at least restrain with their influence or force, the war-believing nations of the world. Which are the peace-loving nations, we do not fully know as yet—all of them. A nation must be capable of making war, and refrain, before its *natural* peaceableness can be known. Some nations, very great ones, too, are today physically unable to make war. Maybe they will continue peaceable even where they become possessed of this dread ability. But we know that there are nations able to make war who believe in peace. Shall they also be able to make peace? And is not their ability to make war a strong element in possible power of making peace?

Delay in Disarmament

Baltimore Sun, 3 February, 1926.—The pessimistic state of mind in England over the prospects for the League of Nations disarmament conference should be set down as one of the inevitable stages in so great and complex an undertaking. It should not halt the movement. Rather, it should intensify the resolution of all who are concerned to make a beginning in reduction of militarism, which does not insure peace for any nation, but endangers it for all, while it sucks the vitality of the common people of the whole world.

If no suspicions, no jealousies, no blind selfishness stood monumentally in the way of reduction of armaments, it would have been accomplished long since, for both the interest and the conscience of mankind desire and deserve it. No argument is needed to demonstrate the enormous obstacles that must be removed. The world knows the deep, haunting fears of the French people, and it knows, too, how those fears are played upon by men, usually well-meaning and patriotic, who are obsessed of the idea that the logic of militarism, so deadly in its effects, is the one sure protection. The result is seen today in the ease with which arguments are broadcast that France must have immense military resources to offset Germany's indus-

tries that may quickly be converted to military uses, and to offset Great Britain's naval strength.

Similarly, Italy has its fears, and, since the Mussolini régime, its party of inflamed ambitions; and Poland and Czechoslovakia, wedged between great Russia and great Germany, have their peculiar nightmares. When we of America consider the ease with which our jingoes stir great masses of our people to fear of Japan we should be able to escape intolerance in judging the nervousness of these other nations.

But if such conditions set up one obstacle after another that seems almost insurmountable, let it be remembered that there is a great, helpful tide of opinion, and if not opinion then emotion, that is running throughout the world. In not one of the important countries of Europe today would any statesman dare talk lightly of war; in not one would any dare become involved in a major war, save to resist outright invasion. Every responsible statesman of Europe knows how close behind his back door is the threat of revolution against war-making governments. France, pictured as the most militaristic people today in the world, actually has a government which fears to tell its masses the whole truth about such colonial encounters as those of Morocco and Syria. If there is such utter abomination of war among the peoples who have seen it in all its stark hideousness—and there is—the men and women who are seeking to relieve the world of at least part of the menace and the deadweight of armaments have a raw material with which to work that no set of nervous or prideful statesmen can afford to ignore.

After all, it is the simple truth that these statesmen are servants; and usually when the test comes, and the massed opinion of their masters, the people, shows signs of asserting itself they are seen to be peculiarly servile servants. They know how to jump quickly. If the men and women who now pay the price in money of armaments, and may in the future pay the price in blood, will demonstrate their undoubted feeling in this matter, the statesmen will find a way to overcome the obstacles. And there is some encouragement in the fact that even among the statemen are a considerable number who feel as do the masses of men. Witness the success at Locarno after many months of precisely such discouragement as now attends the armament discussion. Let the American people keep burning at this moment their part of the fire of agitation.

Postponing Disarmament

Washington Post, 3 February, 1926.—France, Italy, Japan, Czechoslovakia and Uruguay have joined in a suggestion to the League of nations that the meeting of the preparatory commission for disarmament be postponed. Accordingly the League has referred the matter to the council, which will meet next month. It is now vaguely hinted that the commission will be called to meet not later than May 15.

Dispatches from Europe state that other countries were anxious to postpone the disarmament discussion, but did not have the nerve to make the suggestion.

The promptness with which the United States acted in this matter took Europe's breath away. The pretense that the countries of Europe were ready to agree upon disarmament was soon exposed. They are not ready to agree, and they will not be ready in May.

France is the prime mover for delay. She has two wars on hand, both of them wars of conquest and therefore not subject to termination by armistice and peace treaties. France must either crush the Moroccans and Syrians or get out of their territories. The natives are fighting on their own grounds, in their own fashion, and can maintain a draining guerrilla warfare indefinitely. The cost of these wars to France is very heavy. They will cost much more unless France makes war with greater energy.

Therefore it is idle to presume that France will make any agreement to limit her armed forces in the near future.

Doubts as to German disarmament and the purposes of the Russians are given as the reason for postponing the disarmament discussion. This ostensible reason, so far as Germany is concerned, merely adds to the conviction that France is concealing her real plans. Germany is more nearly disarmed than any other country in Europe. Czechoslovakia, Poland, Roumania, and Jugoslavia have large forces, any one of which could march through Germany without hindrance. France has at least 500,000 men under arms, and could double the number in twenty-four hours.

There is force in France's desire to move cautiously in view of the uncertainty regarding Russia. A disarmament conference in Europe ignoring Russia, would be farcical; and if Russia were a member of the conference the proceedings might be more farcical still. Europe dares not disarm while the red army exists. An agreement by soviet Russia to demobilize the red army would not be worth a scrap of paper. Some of the European governments have attempted to establish friendly relations with Russia, on the basis of "solemn agreements," but they have been repeatedly deceived by the communists and are no longer taking the soviet's assurances at face value. The countries which are threatened by Russia are keeping their forces intact. No plan designed by any disarmament commission will induce these countries to throw away their defenses.

Disarmament is a beautiful dream, but it can not come true while imperialism and communism are rampant in Europe and Asia. Justice and liberty are the enemies of peace at this time. Disarmament depends upon a general peace, and peace depends upon justice. Justice is outraged in several regions, and liberty is under attack. Who expects peace while such conditions exist? Apparently American pacifists, who are superior to realities, are the only human beings who expect justice and liberty to yield to peace.

Taking the Profit Out of War

Washington Post, Editorial, 17 January, 1926.—"Taking the Profit Out of War" is the text of a remarkable article by Bernard M. Baruch in the January number of the *Atlantic Monthly*. "An Effectual Means of Discouraging War" would also be a suitable text for the article. Mr. Baruch's experience as chairman of the war industries board during the war enabled him to gain an insight into the interrelation of ordinary peace time activities with national necessities during war. From that experience he drew logical conclusions as to the measures which the United States would be forced to adopt in case of another world war.

Bearing in mind that such a war draws upon the entire population and all its activities of production and distribution, Mr. Baruch outlines a plan which would not only "take the profit out of war," but which, by making abnormal profits impossible, and by compelling all elements of the population to do their share in the national war task, would impress upon the nation beforehand the tremendous responsibility of war, and thus effectually discourage any tendency to seek war except in self-defense.

In peace time the fixing of prices by the government is unwise. In wartime, as Mr. Baruch clearly reveals, price fixing is both wise and necessary; and it must be price fixing all along the line, in order to protect the manpower that serves the industries which maintain the men at the front. The war industries board had reached the point of fixing prices when the Armistice intervened. That step would have been inevitable if the war had continued. Mr. Baruch says:

If we were to start, in the event of another war, at the place where we were industrially when the world war ended, the President, acting through an agency similar to the war industries board, would have the right to fix

prices of all things as of a date previous to the declaration of war when there was a fair peace time relationship among the various activities of the nation. It would be illegal to buy, sell, serve, or rent at any other than these prices. Brakes would be applied to every agency of inflation before the hurtful process started. An intelligent control of the flow of men, money, and materials would be imposed, instead of having the blind panic heretofore ensuing on the first appearance of the frantic demands of war.

Money would be controlled and directed like any other resource. Taking the profit out of war is an orderly and scientific development of the economics and conduct of modern war, necessary to the effective mobilization of national resources and indispensable to equalizing the burdens of war among the armed and civilian population.

The application of this plan, besides making the nation a coherent unit in time of war, would impress upon every class in society a sense of its own responsibility in such event. If it were known that this universal responsibility would be enforced, no class—social, financial or industrial—could fail to understand that, in case of war, it would have to bear its fair share of the burdens involved, and would have to make sacrifices of profit, convenience, and personal liberty correlatively with those made by the soldiers in the field. To this extent, the plan would act as a positive deterrent to any hasty recourse to force in an international controversy.

The scientific study of the problem of adjustment of civilian activities to wartime necessities, and especially the study of the system worked out by the war industries board in actual war conditions, has been provided for by Mr. Baruch in his generous provision for a course of lectures in the Page School of international relations at Johns Hopkins University. Mr. Baruch, with still broader vision, is proceeding to make similar arrangements at leading universities in Great Britain, France, Germany, Italy, and Japan. As a practical effort which appeals to individuals of all nations, Mr. Baruch's plan promises to do more to discourage war than all the leagues and courts that have been set up by governments.

MISCELLANEOUS

Trade Possibilities in Russia

Engineering, 15 January, 1926.—The modern historian—or perhaps rather the modern teacher of history—is in the habit of pointing out that the old conception of his subject, so long dwelt on and taught, gives but an ineffective and incorrect picture of the progress and state of any people. The older school of history directed its attention almost exclusively to records of battles and political and social intrigues, the conditions of common people, and the advances of trade and the arts occupying but small space in its darkling background. Of the insufficiency of this outlook and the essential accuracy of the modern point of view there can be little question. The history of any country is in the end made by its every day people and its thinkers—its dreamers on the hill-tops—and the ordinary properties of history are, usually little more than an excrescence affecting but little the progression, or retrogression, of a nation.

The truth of this modern view receives interesting indirect light from a commercial report on Russia which has just been published by the Institute of Commercial Research. The document is, as it styles itself, a commercial report and does not pretend to be else, but the incidental information which it gives about the state of the country, and which is necessary for its purpose, illustrates to what a remarkable extent the dramatic events of recent years have left the main conditions of the country essentially as they found them. The point is clearly brought out by the problem of the so-called "landless peasants." Russia is in the main an agricultural country of small farmers, or peasants, and quite recently a

special commission appointed by the Soviet government has been investigating the question of, what it terms, "surplus labor" in the villages. The commission reports that there are not less than 18,000,000 of these surplus peasants in the country. The majority consists of landless, unskilled workers. Having no land which they can farm in their small way, the only means of livelihood of these people is to seek casual work. They move constantly from one part of the country to another, mostly in the summer months; and in the autumn return to their villages, with such little earnings as they have been able to amass. The feature of this matter bearing on our present point is that this state of affairs is no recent creation of the Revolution. It existed in Czarist times; when it was estimated that the number of unemployed in the villages was from 18,000,000 to 20,000,000. Figures of this kind can hardly be taken to indicate a state of prosperity and can in themselves carry but little hope to British manufacturers who may be desirous to extend their markets. They, however, do suggest that, in essence, the country is in much the same condition that it was twenty years ago, in which case it should still form an enormous potential market.

A matter arising out of this investigation of unemployment, will serve to illustrate both the attempts which are evidently being made to bring the country to a more healthy economic condition, and also the point of view and essential object of the report. It is proposed to make an effort to deal with this problem of surplus population by carrying out a large colonization project in Siberia. According to the scheme which has been worked out, the transmigration of peasants should begin in 1929, when it is proposed to transfer a first batch of 500,000. This movement will be continued until some 5,00,0000. This movement will be continued until some 5,000,000 or 6,000,000 of the population have been settled on new lands. Incidentally, and before we finally leave our initial point, it may be said that an exactly similar scheme was in being under the Czarist government when in the same way it was proposed to colonize Siberia with the triple object of relieving unemployment, developing the country, and, no doubt with a political object, populating it with pure Russian stock.

It must be noted that this Soviet colonization scheme is apparently genuinely what it pretends to be, and that proper surveys and investigation of surplus lands are being made; while it is intended that houses, sheds, roads, and other such equipment shall be provided for the transferred population. This point brings us directly to the essential business of the admirable report with which we are concerned. It is pointed out in this document that this great movement of population cannot be carried out without enormous supplies of plant and material which certainly cannot be furnished by Russian industries, and those of our manufacturers who are interested in developing their business with Russia, are advised that this project may ultimately furnish an important field for some of their products.

It is clear that this colonization scheme cannot be carried out without very large expenditure. That, indeed, is in many ways the basis of the whole matter. It is unfortunately also the basis of most of the industrial projects which the Soviet government has in hand. It is unnecessary to say that two of the outstanding characteristics of this government are lack of funds and lack of credit. This, however, has not prevented the drawing-up of elaborate and ambitious schemes of which the colonization project, which we have mentioned, is only a sample. It would appear that the compilers of the commercial report are satisfied that the projects are in general put forward seriously, but they suggest that considerable caution is necessary in dealing with official figures, which usually represent what the government would like to spend, rather than what it is likely to spend. It is not possible in the space at our disposal to deal with the various schemes of development in any detail; the general lines of one or two of them may, however, be quoted, to illustrate the trade possibilities which they adumbrate.

The Soviet Government has, according to its constitution, a monopoly of foreign trade, which is carried on by the state through authorized trading organizations. Statutory provision has, however, been made for departures from this main principle, and concessions can be made to private firms trading with private capital. It need not be said that this government monopoly has not proved a striking success, and much pressure has been brought to bear by the trading organizations, in favor of an alteration in the law. This has been refused, but, according to the report, the Communist Party has recently adopted a resolution in favor of drastic alterations in the licensing system, which, it is expected, will considerably facilitate to carrying-on of business with the trading organizations. Working through these trading organizations is perhaps the most immediately promising method by which British manufacturers can attempt to increase their trade with Russia, but, as the bulk of the trade is apparently likely to remain in the hands of the government, it will be well to give an idea of the ambitious Soviet industrial program before referring further with the trading institutes.

The government schemes cover transport and manufacture of all kinds. Shipping may be taken as a first example of the former. In the middle of last year the Russian mercantile fleet consisted of 524 ships of an aggregate tonnage of 256,000, but less than three-quarters of these were seaworthy, and of the remainder a considerable percentage is laid up for lack of cargo to handle. The Commissariat of Ways and Communications has prepared a five years program of development of the merchant fleet, and has placed it before the State Planning Committee, the duty of which it is to examine and report on all such schemes. The program covers the building of 228 vessels of a total deadweight of 819,340 tons, of which the majority are to be driven by internal combustion engines, the total cost being estimated at 114,000,000 roubles. The present Russian rouble has a gold backing and is roughly equal to 2*s*., so that the proposed expenditure on shipping is some £11,500,000. It is also proposed to carry out important port works and to supply a floating dock for Leningrad in 1928, the total shipping expenditure being brought up by these works to £20,000,000, of which £2,000,000 are to be spent in the year October, 1925, to October, 1926. The report makes no attempt to estimate what proportion of this program is linely actually to be carried out, but states that the Soviet shipping organizations are of opinion that the whole of the money will be found.

The material of the Russian railways is apparently in an even worse condition than Russian shipping, and it is reported that nearly half the locomotives, one-third of the freight trucks, and 60 per cent of the passenger stock is in need of repairs, the greater part being practically unusable. In the present condition of the country this state of affairs apparently becomes serious only at the time of the harvest, but since it is upon the harvest that the rehabilitation of Russia to a considerable extent depends, the matter is of great importance. One of the Soviet's industrial schemes consists in the construction of a factory in the Ukraine, with a capacity of from 3,000 to 5,000 heavy goods wagons a year. The matter is still only in the report stages and apparently no business is likely to arise in connection with it for some considerable time. An important railway work in a much more advanced stage is the electrification of the Moscow suburban lines, which has been sanctioned. As it is certain that home industries cannot supply more than a small part of the material required, there may be some possibility for British manufacturers in connection with this project.

Another direction in which it may be possible to extend our exports to Russia is in connection with road transport vehicles. In 1923 international motor trials were held in Russia under the auspices of the Soviet Government. As a result of these tests the Chairman of the Organizing Committee expressed the opinion that vehicles of European pattern were the best for Russian use, American makes being to expensive to run. Following

these trials some orders were placed in Germany, Great Britain, Austria, and France. Actually the greatest purchases of material of this kind up till the present appear to have been of tractors, of which some 4,000 were to be imported last summer and 20,000 in the early part of this year. Reports appeared in the daily press a few days ago to the effect that orders for large quantities of Fordson tractors had been placed in America. It is clear that the possibilities of obtaining orders of this kind must largely turn on the acceptance of the terms of payment available. In the case of the recent orders for textile machinery placed in this country, which amounted to a total of £1,750,000, the terms of payment were 10 per cent cash, 20 per cent in four months bills, 20 per cent in cash on the day of shipment, and 50 per cent spread over twenty months. This expenditure covered part of an ambitious scheme for equipping textile mills, which forms one of the Soviet Government's projects and for which an expenditure of some £9,000,000 is proposed for the year 1925-26. These shipping, railway, and textile schemes form only examples of the projects in hand, and if it is not clear to outsiders where all the necessary funds are to come from, it is probably also not clear to the government. It should be noted, however, that the Soviet Commissioner of Finance is reported to the effect that budget receipts for the current year will be 40 per cent over those of 1924-25. The railways are also stated to be now showing a balance of receipts over expenditure.

One of the great practical difficulties of the country, following directly on the impossibility of its government raising foreign loans, lies in the lack of supplies of all kinds, and particularly of the supplies which are required by the peasants. The buying capacity of the peasants is rapidly increasing, but they will not surrender the fruit of their work save in exchange for goods. Government paper evidently has no attraction. It is particularly in connection with this aspect of the situation that the possibility arises of doing business with the cooperative societies, which handle the bulk of the retail trade. Trade is also carried on by "mixed companies," i.e., companies of which the capital and directorate are (at least nominally) partly Russian and partly foreign. It is suggested in the report* that, apart from keeping in touch with the official Soviet trading organizations in foreign countries, one of the best ways in which a British manufacturer can do business with the country is by working in connection with one of these mixed companies. If at the same time a manufacturer can arrange to conduct buying, as well as selling operations, his prospects will be improved. As Great Britain took considerably more than twice the value of exports from Russia last year as compared with any other country, she should be able to make full use of any advantage this mutual buying and selling gives. With some £8,000,000 worth of exports to Russia she took second place only to the United States in the same year, but the conditions suggest that she should be able to improve this position. Full details of the United States imports are not available, but it is known that that country sent 296,919 tons of foodstuffs to Russia in the year concerned, which helps to explain her leading position.

Royal Air Force and Army Cooperation

The Journal of the Royal Artillery, January, 1926.—Ever since the Royal Air Force broke away from the army and navy in 1918, there has existed the grave doubt whether the break-away would benefit either of the older services. Progress since the war has not tended to diminish this doubt, and as the new service found its feet and developed its own traditions, its own system of training, and its own outlook on national affairs, the tendency has been to make this break-away more complete. In the last war there is no doubt that service in the corps squadrons which were employed mainly on artillery cooperation was unpopular compared with service in fighting

*Russia Commercial Report, November, 1925. The Institute of Commercial Research, 20 Copthall Avenue, London, E. C. 2.

and bombing squadrons, or in the independent air force. The reason for this is not far to seek. There was more honor and glory to be obtained in the fighting units, and naturally the best types of machine were allotted to them. This had the result of attracting some of the best pilots and observers away from the cooperation squadrons somewhat to the detriment of the artillery, and indeed to all arms of the service, as the artillery squadrons were responsible for close reconnaissance, photography, and artillery cooperation for the corps on whose front they worked.

Another factor which is not so generally known is that many of the artillery officers, who had volunteered early in the war to transfer to the flying corps in order to assist the artillery from the air, instead of being posted to command and man cooperation squadrons were taken for other duties, and in this way their experience of artillery was lost to the army.

Now if this was the case in the last war, when the flying corps was, until 1918, an integral part of the army, what may be expected in the future now that the Royal Air Force is a thing apart? The failure to regard the airplane as a vehicle from which to assist the army will be accentuated. It is true that cooperation courses are held at certain centers, but at the present time the air force high command is more concerned with the idea that air power will be the predominant factor in the next war.

Out of seventeen stations in the inland area of the Royal Air Force at home, all but two—Salisbury Plain and Farnborough—are completely out of touch with army units, particularly with the artillery. We of the army would like to see a proportion of air force commanders and pilots made to specialize entirely on army work, living alongside artillery and infantry units, and thus establishing that intimate personal liaison which is of so much greater practical value than short intensive courses of instruction. There are at Aldershot and on Salisbury Plain a few air force units—three or four squadrons out of a total of about thirty, definitely allotted to army cooperation and working in close touch with army units; but the pilots of these squadrons are not permanently earmarked for this work but spend three or four years, or even less, in these squadrons before being moved on to other air duties. There is a danger that the best pilots and observers will be taken, from among those trained in army cooperation work, when an emergency arises, such as the sudden outbreak of a great war against an enemy within air range of our coasts.

Let us look at this question of airplane cooperation with the army from the point of view firstly of the army, and secondly of the gunner. In the early stages of a campaign, before close contact with the enemy is established, the military commander must depend largely on the air force for the necessary information on which to base his plans. Such information will, of course, be supplemented by, and compared with, information supplied by spies, strategic patrols, and so forth. One hopes that the temptation will be resisted to replace the casualties in fighting and bombing squadrons, that will undoubtedly occur in the initial phases of the independent air campaign, from the personnel of corps squadrons. If not, the military commander will have to rely on the reports of observers, many of whom will have but little air experience and will not realize the value of what they are asked to look out for. No general can base his plan on the unverified reports of inexpert observers.

Owing to the importance of the work, and the difficulty of training air force observers in peace, the army commander would prefer to send up staff officers, who know the strategical position and, who, at the same time, have been trained to carry out observations from the air. Again, when touch has been obtained, he will want to have an accurate description of the movements in rear of the enemy's battle front. Here again it is the staff officer, who has been trained to direct the movements of our own back services, who will be of far greater use than the air force observer,

who may not understand the significance of such movements as he may observe.

Now, from the artillery point of view, we work on a stereotyped procedure but little advanced since the end of the last war, whereby the pilot of the "artillery" machine finds and reports targets, observes and reports the fall of shell, while his observer is purely and simply an aerial gunner whose only rôle is to protect the pilot. The pilot has no control over the artillery fire. This system has, with practice, attained considerable success, but we have reached a point when no further advance seems possible. The artillery has deliberately given up one of its eyes to another service, that is to say trusts for the observation of their fire from the air to those who have at best no practical knowledge of artillery, except what has been gained by short attachments or cooperation at practice camps; and when the exigencies of a campaign have carried off the few trained pilots, then the artillery will have to rely on pilots who have only a smattering of knowledge and who barely know the stereotyped procedure.

Therefore the system has to be made foolproof and there can be practically no progress in developing observation. Now that radio-telephony provides a medium for controlling artillery fire from the air we wish to develop observation and control. But no gunner will give over this great power of concentrating and controlling fire to a pilot of another service, who has had no training in the use of concentrated fire, the control of ammunition expenditure, and the hundred and one problems that arise in connection with the observed control of artillery fire. Therefore it follows that gunners must take the air to control the fire of the guns.

The question has long been debated of whether the three-seater airplanes should not be used for observation for the army in general, and artillery in particular. The disadvantages of the employment of three-seater machines with two observers have been ably set forth in a pamphlet by the Air Ministry, and the writer is on the whole in agreement with them as far as they refer to artillery observation. It is unquestionable that the most suitable person to observe this fire is the pilot, who can always place his machine at any moment in such a position that he has the best view possible. A distinguished officer, speaking of army officers being trained as observers, has stated that "the question of artillery observation will not be satisfactory until we have a large proportion of artillery officers trained to take the air (as observers) to be accustomed to move about freely in the air and observe and command from the air if necessary." If we substitute "pilots" for "observers," we are entirely in agreement with him.

Let us now consider the question of the air requirements of the army in a small war. In such a war, one may assume that the enemy will either have no air force at all, or at the most a small number of machines which will probably be badly equipped and handled. The necessity for good reconnaissance by officers who know the theater of war is of enormous importance. Will any air force officer deny that reconnaissance from comparatively low altitudes can be best carried out by officers who have spent many years of their service in or near the locality? Especially is this true in the outposts of empire, where an intimate knowledge of the terrain and of the methods of the enemy is of paramount importance in reconnaissance on the ground or from the air. In such a campaign, the advantage of having fire controlled by an expert artillery officer is obvious. Targets, especially in bush and mountain warfare, will usually be fleeting opportunities, of which the fullest advantage can only be taken by rapid fire guided and controlled by radio-telephony.

What is the best solution of this problem, so vital to the efficiency of the army? If it is impracticable and undesirable that the air force should return to its parent services, then the alternative is for the air force to specialize seriously. It must realize that a proportion of its cadre must

be devoted heart and soul to the army, regarding its machines as vehicles for the collection and dissemination of army intelligence.

We are, as an army, intensely conservative, and army circles, encouraged by the air force, are now under the influence of the airplane fetish. We are taught to regard the airman as a kind of superman; we are told a great deal about air sense and the difficulties not only of flying an airplane but even of going up in the air. We are told horrible stories of officers who were taken up into the air, saw nothing, and were violently ill, thereafter becoming converts to the theory that army officers cannot carry out observations. In the late war, however, the writer, who is a very bad sailor, was sent on a reconnaissance after less than two hours flying, and never as observer or pilot suffered from air sickness.

The young army officer (and he should for physical and psychological reasons be under forty) can be taught to observe as easily as an air force cadet, and his observations will have the greater value as he will have knowledge of troop formations and movements.

The taking and reading of aerial photographs can be quickly and easily taught. The routine of artillery observation can be taught on a miniature range on the floor of a shed with the observer perched on a ladder in the roof. A few hours' practical experience in the air will suffice to make any intelligent gunner officer into a good observer. The actual art of flying an airplane can be taught in a few weeks to nearly any young, fit, and active soldier. The army could furnish today at least ten squadrons of pilots and observers with war experience, who would be fit, after refresher courses in air force units to command and man any cooperation squadrons.

This leads up to the last alternative, the assumption by the army of certain of the flying duties now carried out by the air force. In dealing with this question, it is not so much the provision of staff and other army officer observers for reconnaissance that needs careful consideration, as the problem of how we propose to employ the means of control of artillery fire offered from the air. It is necessary first to discriminate between tactical control and fire control.

Consider the tactical control of light artillery directly supporting an infantry attack, which includes, of course, control of ammunition expenditure per target. To wield this control efficiently the pilot observer must have consulted with the infantry commanders; he must have an accurate knowledge of the ground situation from time to time, and he must have indicated to him from the ground what important targets are to be engaged. In order to carry out these duties, he must fly over our advanced troops, that is to say within range of hostile machine guns. His height must, therefore, be not less than 3,000 feet. From this height he certainly will not be able to distinguish hostile machine gun nests, which will undoubtedly form one of the most urgent targets; he will not be able to distinguish accurately our own infantry advance, or signals made to him from the ground.

We may, therefore, concede that in this, the most important case, tactical control from the air is impracticable. The further deduction from the above is that observers of light artillery will seldom be able to pick up fresh targets within, say, 2,000 yards of the front line; and if they do, they cannot know whether it is tactically desirable to open fire upon them. Fire control from the air of certain targets is another matter altogether. Such targets as hostile reserves, transport, guns, and headquarters will be distinguishable from 3,000 feet. These are counter-battery targets and it is the normal rôle of the medium and heavy artillery to engage them. The best person to carry out fire control of such targets is the medium or heavy battery commander or a gunner officer of his status. Fire control of prearranged targets, i.e., time programs, could also be carried out from the air by pilot-observers of light artillery. This can be carried out by as-

sistant observing officers, that is to say, the battery commanders need not take the air.

The next point to consider is how many machines would be required for use per division, to allow for adequate fire control from the air in war. It may be assumed that each division would have three light artillery brigades reinforced by one army brigade, and supported by one medium brigade and a heavy battery. Allotting balloon observation to the heavy or one of the medium batteries, we should require one machine in the air per medium battery—a total of four machines, and for the field brigades one machine for each of the two brigades that will probably remain under C.R.A.'s control. This gives a total of six machines continually in the air, to supply which two eight-machine flights would be necessary. That is to say, one squadron would be required per division; this is an increase on present organization, which allows one squadron per corps. To effect this, the first step in peace will be to provide gunner pilot-observers for medium or heavy artillery, and the second step to add pilot-observers for a proportion of the field artillery.

The nature and rate of progress will depend on technical developments. We assume that the practical use of radio-telephony for communication between air and ground is imminent, and that the artillery machine of the near future will not require an extensive landing ground in which to land. That is to say that in normal country aerodrome or advanced landing ground can be found within reach by horse or car of the medium artillery and the rear brigades of the light artillery.

There are now three alternatives for effecting this change of organization under which staff or other army officers will be utilized for close reconnaissance, and artillery fire will be controlled by gunners from the air.

a) An army air service, manned chiefly by gunners, entirely independent of the air force. This would be accompanied by obvious difficulties of expense, recruitment, expansion, provision of material, and administration.

b) An army branch of the Royal Air Force.

This is equivalent to manning existing army cooperation squadrons with army pilots—chiefly gunners. That is to say the strengths of the Royal Artillery and the Royal Air Force would remain unchanged, except that a certain number of Royal Air Force pilots and observers would be replaced by an equivalent number of picked gunner and army pilots and observers. There would be no financial increase, but the internal administration of such squadrons would be difficult owing to there being personnel of two services in the same unit, subject to different regulations, wearing different uniforms, and having different traditions. It would be necessary either to attach the army pilots to the air force, or to attach the Royal Air Force ground personnel to the army. Further, the control of fire would not be in the hands of the officers of the battery concerned.

c) The reorganization of army cooperation squadrons so as to affiliate these squadrons to the artillery of the divisions and corps for which the squadrons are earmarked. The gunners would have a proportion of their officers trained as pilots, while a number of staff and other army officers were trained as observers for reconnaissance. In each medium or heavy battery, the major or captain and two subalterns, and in each field brigade four captains or subalterns should be so trained on the type of machine with which these squadrons are equipped. These officers would go up as required to control the fire of their batteries under orders of the artillery brigade or group commander. The organization of these squadrons would be modified to admit of noncommissioned officer pilots being allotted to two flights of each squadron, which pilots would be responsible for test flights and for the moves of their machines from one locality to another.

Of the suggested solutions to this problem which so vitally affect the future progress of air cooperation, the writer prefers (*c*), considering (*b*)

as a practical alternative. Such development would depend on the loyal support of the Royal Air Force and of the artillery. In the latter there are today a considerable number of officers who flew in the Great War. If only half of these would cooperate for a start, undergo refresher courses, and were then posted to units at Aldershot or Salisbury Plain, a beginning could be made. Even if the experiment failed, a number of officers would have been trained in modern air work and would be most suitable to be earmarked for liaison duties with the Royal Air Force in the next war.

America and the Capital Ship

By Sir Herbert Russell, *The Naval and Military Record*, 30 December, 1925.—In the course of an article which I contributed to this journal on September 23 last, dealing with the question of the present-day tactical utility of the capital ship, I wrote: "If the battleship is no longer of visible tactical value to ourselves, she is even less so to the United States and Japan, which are faced with very wide ocean distances in their every strategical outlook."

This article is reprinted in full in the December number of the *United States Naval Institute Proceedings*, a compliment at which I am the more gratified since I cannot but feel that the more widely this subject is discussed on both sides of the Atlantic, the better the prospect of coming to an agreement based upon the ultimate judgment of mature consideration. My own humble belief is that H.M.S. *Rodney* will prove the last battleship (as we now understand the classification) to be launched in the world's naval history. That there will be a very large body of dissenting opinion I fully recognize. But between now and the time when, under the Washington Agreement, any of the signatory powers (with the exception of France) is at liberty to begin fresh capital ship construction, I verily believe we shall find that what is now a widespread feeling of dubiety will have crystallized into a definite conclusion. The reason for indicating France as an exception is that she is at liberty to lay down a 35,000-ton ship as soon as she pleases. But it is pretty clear that she does not choose; her policy is not shaped in that direction.

My reason for referring to the journal of the *United States Naval Institute Proceedings* is because it makes editorial comment upon the text of my article, which may be taken to represent the professional view of the subject. The writer says:

There is a distinct tendency among some British writers to hold to the theme that, while aircraft have not doomed the capital ship, nevertheless, in view of its cost and having in mind the conference on the limitation of armament, a period is approaching wherein both Great Britain and the United States, as well as other signatory powers, might well abolish the capital ship, because cruisers could just as efficiently look after their respective national interests. In this connection there still remains the meat of the whole question, which was noted by the American delegates at the Conference, that with all naval warcraft done away with (so far as surface and undersea craft are concerned) by mutual agreement, a nation's naval strength would then be proportional to her merchant marine.

It is perfectly obvious that should the United States agree to do away with the capital ship and later on, perhaps, subscribe to the principle of doing away with all naval surface and underwater craft, except for police purposes, her naval power would rise or fall with the fortunes of her merchant marine. . . . . This point was fully understood by Messrs. Hughes, Lodge, Underwood, and Root at the Washington Conference, but should still be borne in mind by America in considering the trend of thought that is now appearing for doing away with the capital ship. If the latter is done away with for the new reasons advanced, the next step that might logically be expected would be the limitation, by agreement, of all surface and under-

sea craft. This entire question seems to hinge upon the size and efficiency of the American merchant marine, so far as it relates to surface and subsurface craft.

If this line of reasoning reflects the United States naval view, I confess I cannot see just where it is going to lead us. Not only is it obscure, but it hypothecates conditions which are quite immaterial to any consideration of the tactical value of the battleship. Indeed, it presumes, as a logical result of the abolition of the battleship, the probable doing away with all naval surface and underwater craft except those required for police duties. What justification is to be found for such a presumption I find myself at a loss to discover. We are considering the specific question of the present-day value of a denite type of warship which, I submit, has been overtaken and passed by the changed conditions of naval warfare. That the whole subject of naval strength has to be considered with reference to the mercantile marine which the fleet is called upon to protect is self-evident, but this relationship is very vaguely indicated in the passages I have quoted. Moreover, it is probably true to say that of all the types of surface war craft, none plays a less direct part in commerce protection than the battleship.

I should much prefer to see the matter put in the form of a definite proposition. How does the United States contemplate employing her battle fleet in the event, let us say, of war with another great Pacific naval power? She is increasing the fortifications, the resources, and the garrison of Hawaii. Doubtless the first strategical step would be to base the battle fleet upon Hawaii. But for what purpose? To play the Grand Fleet at Scapa over again? Unquestionably the presence of the American battle fleet in Pearl Harbor would ensure the safety of the trade route across a fairly wide surrounding zone. But a battle fleet is expected to fill a very much more positive rôle than this in wartime if it is to justify its traditional purpose. A battle fleet is expected to seek out the enemy battle fleet and bring about a grand clash which may exercise a decisive influence upon the entire war. And because it appears so very improbable, under the conditions of modern sea combat, that it will be able to attain its objective in this way, I say that the battle fleet (and consequently the battleship, which must always be regarded as a single unit of a collective force) has outlived the era of its utility.

Mr. Hector Bywater has written a book which demonstrates that in a war with a great Pacific naval power the United States will be able to employ her battle fleet with very effective results. His thesis is ingeniously worked out, but it takes as its premise the willingness—indeed, the positive eagerness—of the battle fleet of the great Pacific naval power to accept action. Granted that we have two sides spoiling for a fight, the battleship can certainly continue to justify her rôle. But I do not fancy the serious student of naval strategy will grant anything of the sort. All sea warfare has produced the same situation at one period or another of the struggle; one side wanting to fight, the other side wanting to avoid fighting. And under modern conditions it is so much easier to avoid fighting; so infinitely more difficult to force a reluctant foe into fighting than in bygone times. The Grand Fleet only joined battle once in four years with the High Seas Fleet through a miscalculation on the part of Admiral Scheer. In 1914 Mr. Churchill talked heroically about "digging them out of their holes." He had not then learned that even the splendid *Queen Elizabeths*, with their 15-inch guns and their 25-knots speed, were impotent against an enemy who had made up his mind never to give them an opportunity.

As I have said, I hope to see this question freely debated by those who are qualified to discuss it in the United States, because upon the verdict of the United States will probably depend the answer to the question which is now exercising naval tacticians on this side of the Atlantic. Mere pride of possession of the biggest, the finest, the most powerful warships in the world is rather apt to obscure clarity of vision. In the *Rodney* and *Nelson*

we now possess the two "last words" in battleship power. We are entitled to believe that, in level combat, they could smash up any other two battleships. But it is a mere elementary principle in the game of war to avoid giving to the superior side the chance it wants. Strategical skill in forcing that chance is so hedged about by almost prohibitive risks in these days that even the classic phrase, "the Nelson touch," has become a sheer anomaly. Dash and daring may become sheer imprudence in the face of hidden perils.

I will not attempt to labor points which I have already advanced in former articles on this subject. My real purpose in writing this article is to express satisfaction that the matter has come under discussion in a professional organ of the United States Navy, and to express the hope that this discussion will continue and extend. The capital ship can only be abolished by international agreement. Before we can hope for any such agreement the whole controversial question must be exhaustively debated. If one power insists upon retaining the capital ship, the other powers which still maintain her will have no alternative. If all agree to abandon her, then all will remain in the same relative position.

In any case she is the one type of naval unit which could best be spared, because she has been reduced to more severe tactical limitations than any other class of warship. The Washington Agreement stopped competition at a period when the 55,000-ton battleship was being talked about, and undoubtedly would have come without such a pact. More important still, it has stopped competition for a period which is giving ample time for mature consideration. I cannot pretend to interpret the Japanese view, but I venture to think that for the same reasons that are attracting so much thoughtful attention in this country, and are beginning to attract attention in the United States, Japan would be willing to come into line with the other naval powers.

We want, as far as is humanly possible, to try and visualize the strategical conditions of future naval war, to realize the character of new weapons and new methods which have been evolved since the Great War, and then, by the light of this vista, however sketchy it may necessarily be, try and realize what part the great ship-of-the-line can possibly play in it.

Saluting the Quarter Deck

The Army, Navy and Air Force Gazette, 2 January, 1926.—A correspondent of the *Times* Literary Supplement quotes a statement by Mrs. Irene M. Vaughan in the *Dublin Review* that one theory often given in explanation of the custom of saluting the quarter-deck is that a crucifix hung always at the break of the poop. Possibly this was so, as the correspondent agrees, but he has never found a shred of evidence for it in accounts or inventories. On the other hand, there are fairly numerous references to statues and "ymages" of great size and ornateness, fashioned somewhere in "lesterne" of the King's ships. Thomas Prynce was paid £14 for painting the *Trinitee del Tour*, "with four ymages, namely, with the ymage of St. George, St. Anthony, St. Katherine, and St. Margaret wrought with gold and standing in lesterne of the said ship." In the same year he was commissioned to paint the barge *Nicholas* in a black ground color *semé* of ostrich feathers in white and gold with "an ymage of St. Christopher of pure gold." It is, after all, nothing new, but a baptised custom from Heathenesse. The Athenian ships carried a statue of Pallas Athene, the Carthaginians of the god Ammon; each city or race its tutelary deity, which served thus, in dual purpose, as a distinctive national emblem. With the Reformation, the pendulum swings back from Calvary to Olympus. Elizabeth's *White Bear* carried "an image of Jupiter, sitting uppon an eagle with the cloudes before the heel of the shippe," and "a great piece of Neptune and the nymphs about him for the upright of the sterne." We still, however, as Sir Alan Moore points out, should expect to find "evidence that

the quarter deck was saluted between the Reformation and, say, the Napoleonic wars. Perhaps such evidence exists."

What It Means to Be an Officer

Address of Captain Reginald R. Belknap, U. S. Navy, Commanding, Naval Training Station, Hampton Roads, to Naval Academy Preparatory Class, 6 November, 1925.—I feel it quite an honor to be addressing you today, for I may be looking at some who will be admirals. Though I may not live to see that event, I may have the satisfaction of seeing some of you reach command and be well on your way to that high place. From my own thirty-eight years service and sixteen earlier years in naval atmosphere, I can picture many things that lie ahead of you who gain admission to the Naval Academy and become officers.

For entrance into the Academy you have entered upon a preparatory course of study here and in the middle of April you are to take a competitive examination. A similar class of candidates studying at San Diego will also compete and not over one hundred of the highest who pass that examination will become midshipmen. At the Naval Academy you will be on the same footing as those who come in directly from civil life, and upon graduation you will become commissioned officers in the Navy or Marine Corps.

The study courses provided here and at San Diego serve the same purpose as outside preparatory schools do for candidates appointed from civil life. At a Naval Training Station you will be under instructors who were themselves midshipmen a few years ago and you will keep routine hours similar to those at the Naval Academy. Your previous naval experience should be a direct help in buckling down to your tasks. You will be in the midst of naval surroundings, in a naval atmosphere. Thus altogether the circumstances and influences here are favorable for your endeavors, and if you are earnest in the purpose to become officers, if you apply yourselves seriously to study, working faithfully, honestly, and attentively, you will find all hands ready to help you to make the most of this opportunity. For it is a great opportunity for you, greater than any of you yet realize.

What does it mean to be an officer? Young men give various reasons for enlisting in the Navy, but at the bottom of all their reasons is the idea to better themselves in some way. The same is true in regard to becoming officers: each one of you thinks to better himself thereby; and that purpose is worthy, if what you have in mind shows a right understanding of the position and the character of an officer. Let us consider what these are.

First, an officer's position is to be a leader. Every group of men must have a leader, if the efforts of the individuals are to be combined towards a common end. Some leaders have limited fields of authority, such as petty officers, and some are in authority only temporarily, such as men in charge of small working parties; but when we speak of a naval officer we mean one who is in authority permanently. An enlisted man engages to serve for a stated term, usually four years; but the great majority of sea officers follow their career throughout their vigorous physical activity. So we may say that in studying to become a naval officer you are aiming to devote the better part of your life to being a naval leader. That is the idea that you should have. Circumstances may, of course, necessitate changing to some other vocation; that may happen in any walk of life; but in order to develop your best powers, your resolution now should be fixed on a naval life.

One who is in a leader's position is looked to by his men to arrange their duties, to show the way, and to combine their efforts; and he is looked to by his superiors to produce results. He is in focus from above and from below, responsible for accomplishing what is expected of him and account-

able for the effectiveness of his men's work. Thus by the very fact of his being a leader an officer's position is conspicuous.

To what degree officers of the Navy are conspicuous, in what way they are prominent and important, was expressed in the address of President Coolidge before the last graduation class at the Naval Academy. He said:

"The naval officer is a constant testimony throughout his life that America believes in military preparation for national defense, for the protection of the rights, the security and peace of her citizens. He is called to places of responsibility and command. He is given power of life and death over his fellow countrymen. The naval officer represents the power, the glory, and the honor of this nation among foreign peoples, with all the prominence that arises from wearing the uniform and carrying the flag. It is the last point—carrying the flag—that has made the naval officer, as it has made of the army officer and member of the diplomatic service, a figure of distinction. It would be unfortunate for the country if that distinction should ever become lightly valued, either by those who have it or by the people whose government, through its president, bestows it."

There you have a clear, impressive definition of the officer's position: a life witness, in great responsibility, representing the power, the glory, and the honor of the nation, symbolized in the flag.

To fill such a position, what must be an officer's character? In the written commission given to each officer, the President declares that he "reposes special trust and confidence in the patriotism, valor, fidelity and abilities" of the officer; and the very first of the Articles for the Government of the Navy requires higher naval officers "to show themselves a good example of virtue, honor, patriotism, and subordination."

These few words set the standard of character. The man they describe is one of good morals and strong spirit, courageous, daring; brave to endure, face, and bear up against danger and evil; the kind of man that commands respect and attention among all classes everywhere. They describe a man of keen sense of duty, a man of loyalty and high courage to do the right thing in all cases, especially towards inferiors or dependents and regardless of cost to himself; a man faithful to trust, even when neglect would not be found out or would bring no punishment nor reproach; a man who thinks of his duty, of the service, of his men, first, and of himself and his personal interests last. By patriotism is meant devotion to the country, not in words merely nor in outward show, but with true and whole-hearted constancy working for the country's best interest. By subordination is meant the regulation of all things in due proportions, so that our efforts may be harmonious and unified and thereby more effective.

The standard of character thus set forth is a high one and it must be high to carry an officer's responsibility. You who are now at the threshold have living examples in the older officers, and the Naval Academy training aims throughout to mould the midshipmen's character so that, as a Superintendent of the Naval Academy has said, "the product will be of uniformly high quality, capable of meeting manfully, courageously, and efficiently whatever situation may arise; making officers who will be a credit, an honor, and an insurance to the government they represent; officers who, with our experiences at their disposal, will be better fitted to carry on than we have been. In such moulding, physical condition, scholastic attainment, gentlemanly qualities, all have important places, but all are superstructures upon an adamant foundation which is character, with truth for the cornerstone. There can be no substitute for unimpeachable character among those who hope to win a naval commission. The fundamental of an officer's value to the service is his trustworthiness." The President who appoints you must be able to repose special trust and confidence in your fidelity.

In the service, the words officer and gentleman are inseparably coupled. One is no true officer who is not a gentleman, and the qualities that mark the

gentleman make the best foundation for building the naval officer's special abilities. Truth and honesty, fairness and consideration, courage and fidelity—these basic qualities, not fine manners, show the real gentleman. They are the qualities that make for the honor of a gentleman. Take them to heart and your outward manner will grow in keeping, and you will acquire that nicety of honor which is the distinguishing attribute of the officer and gentleman.

So far I have spoken to you in somewhat abstract terms, laying down principles that should guide and keep you straight in your endeavors. Now let me put a little human touch into the picture.

In the first place, as members of the seafaring profession your field is world wide and the history of your calling goes back as far as the record of man can be traced. The seafaring profession unites all countries by means of the sea and makes of its members a world brotherhood, regardless of nationality and race. There is something one seafaring man feels for every other seafaring man that forms a bond not found in any other profession. As naval men you are in this world-wide profession and you inherit a share in its wonderful history through the centuries. More particularly, your own naval history as Americans goes back one hundred and fifty years, in which period from the first our Navy has been a powerful instrument for world progress. Our service has been one of the most potent influences for the advancement of civilization through right and fair dealing, mutual understanding, and the peaceful, friendly relations thereby promoted.

Of the men that will ever stand out in the pages of history, probably the first and widest known of our Navy is John Paul Jones, whose body now lies buried in the Naval Academy. When, with his ship on fire and in sinking condition, asked would he surrender? his reply, "Surrender? No! I have just begun to fight!" voiced a wonderful spirit and struck a keynote characteristic of our Navy ever since. For in 1812, when we went to war with Great Britain, at a time when our Navy was very small and the British Navy was believed to have a mastery over the sea that nothing could break, nothing could resist; when the President and his advisers wanted to shut our ships up in harbor and not permit them to go to sea, proposed to put them away like toys: our naval leaders of the time were stirred by the same spirit as given utterance by Paul Jones, and so persuasively that they prevailed upon the President to let our Navy operate actively at sea. Few as our ships were, weak as the Navy was as a whole, their achievements soon justified the confidence of our naval officers in the efficacy of their own dauntless spirit. They were willing, able, ready—and thereby were strong—to use what means they had with their best powers in their country's service.

Bear that in mind, and be mindful of it not only in emergency but also in every task of your daily grind of work. Here you will need fidelity, and you may be helped in it by the knowledge that fidelity in every task will serve your country quite as vitally as fidelity in emergency; because, if not faithful in daily work, when emergency comes you will not be prepared.

Recently we have had at the front the restoration of the famous old frigate *Constitution*. Her capture of the *Guerriere*, the first frigate taken from the British in the 1812 war, was a turning point in our country's history. How was it, how did it come about, that she was able to make that capture, so momentous for our welfare? It was at bottom because she was a well organized, well trained man-of-war, in which the officers and men knew their duties singly and worked as a whole to make the best of their ship. That war had been brought on partly by England's impressment of American seamen; it was regarded largely as a war for sailor's rights. A few months before, an officer said to some *Constitution* sailors, "This war will be in your interest. We hope you men will do your duty." One replied, "Let the officers look out for the quarterdeck; we will work the guns."

That was the spirit of the ship, and when, soon after the war began, the *Constitution* was nearly surrounded by five British vessels, which strove three days for her capture, it was the experienced, faithful, unflagging working together of the ship's company that enabled her to escape. A month later she put to sea again, met the British frigate *Guerriere*, and won a sweeping victory. The victory itself was a handsome performance, and most conspicuous for its timeliness in our country's critical hour, but the chief lesson for you is that it was the triumph of the ship's company's *regular work well and faithfully done*. It was that which enabled the gallant ship of the young American nation to surmount a three-day ordeal and afterwards, having escaped and all the more fit from that extreme test, to win a victory of world effect. Fidelity in the day's work developed the ability to make good the spirit to win.

Along with your studies here, read naval books, interesting books on our naval history. They will help to keep your mind fresh on your purpose. They will show you more instances of what men of the Navy have done for the country, the deeds of men who used their best powers to make the Navy a strong, reliable arm of the government. Such reading will show how the naval officer became a character of world-wide distinction.

Your coming here as enlisted men after a period of service experience should help you to understand something of the position of a leader as seen by those led. You have served under naval officers and have probably formed some idea of what should be found in an officer. In preparing yourself for that position, your enlisted experience should help you learn how to arouse in men the right feeling towards their leader, the kind of feeling that unites a group's efforts with maximum effect. And your service experience, brief as it has been in some cases, will have shown you that, whether or not an officer arouses in you personal liking, you will follow and obey him if his character commands your respect.

The character that does so is built upon the qualities before described here, summed up as virtue, honor, patriotism, subordination, and fidelity, so cultivated as to develop the fine sense of honor that distinguishes the naval officer and gentleman. To these qualities one thing more is needed to hold your men's respect, namely, the ability for your task. The requisite abilities you must develop along with your cultivation of the other qualities, in order to fulfill the President's "special trust and confidence in your abilities." And as your experience grows you will make the effort to qualify yourself the more willingly as you increasingly perceive that no officer and gentleman can feel satisfied in his heart, unless he have ability appropriate to the responsibility and powers of his charge.

Now the prospect of a career opens out before you. You have five months here of earnest, solid work. Make the most of your time. Be intent on your goal. Those who are successful—and I hope a large number will be successful—will pass into the corps of officers where you will be leaders and later come to positions of command in the American Navy. As officers you will have the respect and following and will direct and lead the successful efforts of American naval seamen, a body that has made one of the finest records in modern history. A veteran in the fourth generation of that distinguished American family of statesmen, presidents, diplomatists, and writers, Brooks Adams, writes, "I always enjoy meeting officers of the services. They are well informed, intelligent, and patriotic. In my opinion they are the finest product of our civilization." Such is the esteem the American naval officer has earned. To be of that body is an honor than which there is no higher.

CURRENT NAVAL AND PROFESSIONAL PAPERS

"The Passamaquoddy Tidal Power Development." *The Tech Engineering News,* January, 1926.

"Aeronautics in 1925." (British—very comprehensive.) *The Engineer,* 1 January, 1926, *et seq.*

"Some Factors Affecting the Resistance of Ships in Waves." *The Engineer,* 25 December, 1925.

"Double-Acting, Two-Cycle Oil Engines and the Mirlees Nobel Two-Cycle Engine." *The Shipbuilder,* January, 1926.

"Wrought Iron." *Engineering,* 15 January, 1926.

"Torsionmeters." *The Engineer,* 15 January, 1925.

NOTES ON INTERNATIONAL AFFAIRS

FROM JANUARY 3 TO FEBRUARY 3

PREPARED BY PROFESSOR ALLAN WESTCOTT,
U. S. NAVAL ACADEMY

UNITED STATES

SENATE APPROVES PARTICIPATION IN WORLD COURT.—Following the adoption of the cloture rule to overcome delay and opposition to action on the question of American participation in the World Court, the United States Senate on January 27 approved participation by a vote of 76 to 17, which was considerably more than the required two-thirds majority. Both those who approved and those who disapproved this action regarded it as a step closer to the League of Nations. The approval of the Senate did not extend to the optional clause in the Court Protocol providing for compulsory jurisdiction.

Of the reservations, given below, which accompanied the approval, the only ones regarded as of special significance are the fifth and the two following. The fifth reservation requires the Court to give its advisory opinions publicly after public hearing, and to give no advisory opinion without the consent of the United States on any question in which the United States has or claims an interest. This apparently would modify somewhat the policy of the League Council in calling upon the Court for advisory opinions. Another reservation calls for approval of the reservations by all the nations who participate in the Court before the signature of the United States is affixed. Still another provides that recourse to the Court for settlement of a dispute between the United States and any other state can be had only after a treaty between the two parties—which would require approval by the Senate by a two-thirds vote. The Resolution follows:

WHEREAS, the President, under date of February 24, 1923, transmitted a message to the Senate, accompanied by a letter from the Secretary of State, dated February 17, 1923, asking the favorable advice and consent of the Senate to the adherence on the part of the United States to the protocol of December 16, 1920, of signature of the statute for the Permanent Court of International Justice, set out in the said message of the President (without accepting or agreeing to the optional clause for compulsory jurisdiction contained therein), upon the conditions and understandings hereafter stated, to be made a part of the instrument of adherence. Therefore, be it

Resolved (two-thirds of the Senators present concurring), That the Senate advise and consent to the adherence on the part of the United States to the said protocol of December 16, 1920, and the adjoined statute for the Permanent Court of International Justice (without accepting or agreeing to the optional clause for compulsory jurisdiction contained in said statute), and that the signature of the United States be affixed to the said protocol, subject to the following reservations and understandings, which are hereby made a part and condition of this resolution, namely:

1. That such adherence shall not be taken to involve any legal relation on the part of the United States to the League of Nations, or the assumption of any obligations by the United States under the Treaty of Versailles.

2. That the United States shall be permitted to participate, through representatives designated for the purpose and upon an equality with the other State members, respectively, of the Council and Assembly of the League of Nations, in any and all proceedings of either the Council or the Assembly for the election of judges or deputy judges of the Permanent Court of International Justice, or for the filling of vacancies.

3. That the United States will pay a fair share of the expenses of the Court, as determined and appropriated from time to time by the Congress of the United States.

4. That the United States may at any time withdraw its adherence to the said protocol, and that the statute for the Permanent Court of International Justice adjoined to the protocol shall not be amended without the consent of the United States.

5. That the Court shall not render any advisory opinion, except publicly after due notice to all States adhering to the Court and to all interested States, and after public hearing given to any State concerned; nor shall it without the consent of the United States entertain any request for an advisory opinion touching any dispute or question in which the United States has or claims an interest.

The signature of the United States to the said protocol shall not be affixed until the powers signatory to such protocol shall have indicated, through an exchange of notes, their acceptance of the foregoing reservations and understandings as a part and condition of adherence by the United States to the said protocol.

Resolved, further, as a part of this act of ratification, that the United States approve the protocol and statute hereinabove mentioned, with the understanding that recourse to the Permanent Court of International Justice for the settlement of differences between the United States and any other State or States can be had only by agreement thereto through general or special treaties concluded between the parties in dispute; and

Resolved, further, That adherence to the said protocol and statute hereby approved shall not be so construed as to require the United States to depart from its traditional policy of not intruding upon, interfering with or entangling itself in the political questions of policy or internal administration of any foreign State; nor shall adherence to the said protocol and statute be construed to imply a relinquishment by the United States of its traditional attitude toward purely American questions.

CONGRESS APPROVES ARMS CONFERENCE FUND.—In accordance with a special message from President Coolidge the House of Representatives on January 18 approved an appropriation of $50,000 to pay the expenses of American delegates to the Preliminary Arms Conference set for February 15 at Geneva. The sending of an American delegation was also approved by the Senate and Secretary Kellogg at once notified the League of Nations Secretariat that the United States would take part. It was expected that Hugh Gibson, U. S. Minister to Switzerland, Rear Admiral Hilary P. Jones, and Brigadier General Harry A. Smith would constitute the American delegation.

It was fully expected that this first meeting of the preparatory commission would be postponed until April at least, partly to enable Germany to enter the League of Nations, and partly in the hope that Switzerland might find a way to meet the Soviet Government's objections to sending any

delegates to a meeting place in Switzerland since the assassination of a soviet representative in Switzerland last year.

No surprise was felt, therefore, when at the joint request of France, Italy, Japan, Czecho-Slovakia, and Uraguay the meeting was postponed to a date to be set at the March meeting of the League Council, but to be not later than May 15.

UNITED STATES AND LATIN AMERICA

MEXICO EXPLAINS OIL AND LAND LAWS.—Following formal protests on the part of Ambassador Sheffield at Mexico City against the retroactive features of the new Mexican Oil and Alien Land Laws, a reply was received from Mexico on January 22, presenting the Mexican defense of these measures. Although the terms of this reply were not made public, it was thought to follow closely the statements made by the Mexican Foreign Minister to the press.

The new laws, it is estimated, would virtually confiscate American owned property to the value of $500,000,000. By a provision of the Mexican Constitution of 1917 no aliens are allowed to acquire real estate in the border coastal zone. The new land law provides for ousting foreigners who had secured property prior to 1917 by requiring that upon the death of the owners the heirs must sell to Mexicans within five years' time.

The law further provides that outside the border zone aliens can hold land only on condition that they sign an agreement renouncing the right to make diplomatic claims as to their properties, in other words renouncing their rights as citizens of their own country. Foreign companies holding more than 50 per cent of the stock in a Mexican concern must within ten years dispose of the stock above this percentage. Against these measures, it is argued that while the Mexican government has the right to acquire any foreign owned property by purchase, these forced sales would amount to confiscation.

Last year Secretary Kellogg issued a warning to the effect that "the government of Mexico is now on trial before the world." "It should be made clear that the United States will continue to support the government of Mexico only so long as it protects American lives and American rights and complies with its international obligations." Recognition of the Mexican government was accorded by President Harding on the definite statement from President Obregon that the Mexican constitutional provision relating to land would not be interpreted as retroactive. The new laws, enacted under President Calles, would seem to disregard this promise.

TACNA-ARICA PLEBISCITE.—In January, Major General William Lassiter was taken from the Canal Zone to succeed General Pershing as head of the Tacna-Arica Plebiscite Commission. General Pershing was forced to resign on account of ill health. General Lassiter took with him to Tacna-Arica a large number of United States citizens who will act as supervisors in the plebiscite set for April 15. Upon protests from Chile regarding the decisions of the commission under General Pershing and the late date set

for the plebiscite, President Coolidge upheld the actions of the commission. According to reports from General Pershing, the Chilean authorities had attempted by rioting and forced expulsion of Peruvians to prevent a fair plebiscite.

DEBT SETTLEMENTS

ITALY AND BRITAIN REACH DEBT AGREEMENT.—A British-Italian debt agreement was signed by Count Volpi, Italian Foreign Minister, and Winston Churchill, British Chancellor of the Exchequer, in London on January 27. In general terms the agreement provides for the payment of an average of something over £4,000,000 annually for sixty-two years, England returning during the same period the £22,200,000 in gold deposited by Italy as security for her war loans. A clause in the agreement stipulates that England will reduce her demands on Italy in case her receipts from other war debtors and from Germany at any time exceed her debt payments to the United States, and on the other hand increases may be called for in case of reductions in these receipts.

As summed up by the Italian Minister, the Italian debt to England was 39 per cent greater than to the United States; but Italy will pay to the United States a total of $2,408,000,000 and to England only $1,346,000,000. However, Italy will make much larger payments to England in the first twenty years.

AMERICAN DEBT AGREEMENTS APPROVED.—On January 15 the United States House of Representatives approved the Italian-American debt agreement by a vote of 257 to 133, and also the agreements with Belgium, Roumania, Czecho-Slovakia, Esthonia, and Latvia. Approval of the Italian agreement was delayed in the Senate.

Representatives of Greece and Jugo-Slavia arrived in Washington in January for debt conferences, and it was anticipated that the new French Ambassador, M. Henri Bouranger, would also take up at once the settlement of the French debt. The Greek mission offered to fund her debt of $15,500,000, provided the United States would lend $32,200,000 additional, which would be the remainder of the credits originally extended. When this offer was declined, the head of the Greek delegation returned to consult his government.

CENTRAL AND EASTERN EUROPE

GERMAN CABINET REORGANIZED.—After six weeks' delay the long ministerial uncertainty in Germany was ended on January 19 by an ultimatum from President von Hindenburg giving Dr. Luther and the leaders of the middle parties four hours to come to an agreement. Settlement was hastened by rumors of the possibility of setting up a dictatorship under Luther and Stresemann. The cabinet as reorganized by Chancellor Luther can count on support from the Democratic, Center, and People's Parties (about 170 votes), and the benevolent neutrality of the Socialists; against it is an opposition composed of the radicals of both wings, and commanding also about 170 votes.

In the parliamentary debate on January 27, at which the cabinet won a vote of confidence by a narrow margin, Chancellor Luther came out definitely for German entry into the League of Nations.

HUNGARIAN COUNTERFEITING PLOT.—Great excitement was aroused in Hungary and throughout Europe by the revelation early in January of an immense counterfeiting plot involving Prince Windisch-Graetz of the Hungarian nobility, the chief of police of Budapest, and many high officials in the entourage of the Regent Horthy. The counterfeiting of French 1,000 franc notes was undertaken on a tremendous scale, not only to enrich the conspirators but also to demoralize French currency, and perhaps to supply funds for a *putsch* against the present Hungarian government. The notes were printed on the government presses used normally to print Hungarian paper currency. Prince Windisch-Graetz was leader of the Fascist element in Hungary, and a supporter of Archduke Albert for the Hungarian throne.

DICTATORSHIP IN GREECE.—On January 4, General Pangalos, who since his overthrow of the Michalakopulos Ministry last July has been in virtual control of the Greek Government, declared the Greek republican constitution null and void, and established himself as military dictator. He became premier and minister of war in the new government, with Admiral Hajikiriakos associated with him as minister of marine.

For the new dictatorship in Greece, following the example of her southern neighbors, Italy and Spain, various reasons were given: (1) weariness of the army and navy at the endless quarrels between the Venizelists and other parliamentary factions in Greece; (2) dissatisfaction at the weak rôle of Greece in foreign affairs, especially in view of the Russo-Turkish neutrality agreement, the Turco-Slav negotiations at Belgrade, the hostility of the Jugo-Slav press, and the defeat of Greece in the League settlement of the Greco-Bulgarian outbreak, and (3), fear of the results in case a parliamentary election were held, owing to the spread of communistic doctrines. "I considered it necessary," declared Pangalos, "to the welfare of the country, since the whole nation is tired of worthless parliamentarians." And again, "Henceforth with the help of the army and navy I will govern as dictator. Greece in a few months will have a fleet dominating the eastern basin of the Mediterranean, and the strongest army in the Balkans."

As a novel expedient to reduce the government debt, Pangalos had each holder of Greek paper currency clip off one fourth of each bill. The remaining three fourths was correspondingly reduced in value, but the one-fourth part was to be held by the owner for future redemption, when Greece should be able to pay.

FAR EAST

JAPANESE FORCES IN MANCHURIA.—Events in the Far East during January served to direct attention to the increasing conflict of interests between the Soviet Government and Japan, not only in the economic exploitation of the rich territory of Manchuria, lying as a kind of no man's land between

the two nations, but also in their dealings with the various powers that be in China.

During the conflict in Manchuria between Chang Tso Lin and his rebellious subordinates, Japan increased her forces in Manchuria and occupied Mukden. In a speech before the Diet on January 21, Foreign Minister Shidehara defended this move as called for by the foreign consuls in the city (this did not include the U. S. Consul) and essential for the safeguarding of foreign as well as Chinese lives and property. The Baron declared that Japanese relations with the Soviet Government were "making steady progress," as evidenced by recent Japanese contracts for oil and coal concessions in Northern Saghalien.

The following discussion of the Japanese action appeared in the *New York Times*, reprinted in *Literary Digest* of January 9:

"In sending reenforcements into Manchuria, the Japanese government is acting within its rights under the Portsmouth Treaty, which allowed it a garrison of 15,000 men in the country.

"The interests which Japan is now engaged in protecting are very real. She has 438 miles of trunk-line railway from Dairen to Changchun, and 250 miles of branch lines. Her mining and commercial interests are extensive. While Manchuria has not developed into a region for Japanese colonization, as was once expected, there are more than 150,000 Japanese residents in Manchuria, with another 200,000 in the leased territory of Kwantung, which Japan took over from Russia in 1905.

"Manchuria has not lost by the presence of the foreigner. When Russia set to building her railroads across the country east to Vladisvostok and south to Dalny and Port Arthur, it was largely an empty land. By 1908 Manchuria had 16,000,000 inhabitants. Today it has nearly 20,000,000. They are Chinese who have poured northward from the overcrowded Eighteen Provinces, with the result that Manchuria has grown faster than any other part of China. The soil, among the most fertile on earth, is yielding great crops of soya beans and wheat, and the opportunities for the latter are said to be enormous. Over this good-sized kingdom Chang Tso Lin has hitherto ruled with absolute authority, the one stable factor in ten years of Chinese turmoil. If he should now succumb it may mean that Japan will simply have to do business with another Manchurian war-lord."

Soviet Protests at Attacks on Railway.—In the third week of January the Soviet ambassador at Peking, M. Korakhan, vigorously protested to the Chinese government and to Chang Tso Lin against the latter's action in taking over the Eastern Chinese Railway in Manchuria, arresting the Soviet manager of the road, and committing alleged injuries to the property. It appeared that during Chang's difficulties with his followers, the Russian authorities had refused to transport his troops and trust to getting their pay out of profits due the Chinese government, and that after Chang's success he had taken measures of retaliation. Soviet forces were massed on the frontier, and the Peking government was warned that unless it could discipline Chang, the Soviet authorities would adopt their own measures. Danger of such an event was removed, according to a dispatch of January 23, by the release of the Soviet railroad manager and renewal of an agreement between the Soviet authorities and Chang providing for

the transport of Chinese troops with payment to be taken from China's share of the railroad profits.

On January 22 it was reported that General Feng Yu-hsiang, the pro-Soviet leader in Central China, had postponed his projected retirement and visit to Russia.

RUSSIA'S FAR EAST THREAT.—(From Boston *Herald* in *Literary Digest*, January 9.) "Both China and Japan have cause for anxiety since Russian arms and munitions enabled General Feng-Yu-hsiang to capture the port of Tientsin. On the surface the eyes of many other nations may see at first nothing more than the good news that Feng's success has put an end to the stoppage of railway communication between Peking and the sea. But an attempt by Bolshevist Russia to gain possession of an ice-free Pacific port is dreaded, and it is suspected that the design may lurk under the relations established between the Moscow government and the so-called Christian General.

"The Soviet commissars are apparently as eager as ever the absolute Czars were for Pacific dominion, with a naval base and a navy fit to face the flag of the sunburst. Planning recovery and extension of power in Manchuria, they began in 1920 the forcible expulsion of those Japanese who had spread over the Transbaikal and Amur provinces, and within a year they were back at Vladivostok and Nikolaievsk with no potential enemy in the rear, and with freedom to devote diplomatic artifice to winning from China the control of the Chinese Eastern railway through Manchuria. In May, 1924, they won.

"Mongolia was invaded by a Moscow force in 1921. It derided the Chinese suzerainty and set up a government of the Province, naming it the Mongolian Soviet State. Its importance to Russia is as a shorter way to the sea.

"Is Moscow scheming for a Chinese port which would menace Japanese security? The world would like to know. Its contemplation of peace in the spirit of Locarno has a cold shadow cast upon it by this situation in the Far East."

JAPAN'S PRESENT MODERATE POLICY.—(By Felix Morley, writing December 15, in Baltimore *Sun*, January 5.) Against sharp domestic criticism Premier Kato, Baron Shidehara, his foreign minister, and, so far as can be gathered, the rest of the present cabinet, are supporting a policy of non-intervention in China. There is no disposition apparent in official circles to afford open or disguised support to Chang Tso Lin, despite the fact that this war lord has always been friendly to Japan in the past, that Japanese commerce in Manchuria has flourished coincident with his administration, and that assistance is popularly supposed to have gone to him from Tokio in earlier struggles.

The passivity of the Kato government in the present crisis is the more noteworthy because no one knows with any certainty what General Kuo's attitude will be if Chang is forced to surrender Mukden, and because disorder in Manchuria in place of the order of recent years is probable whatever the military outcome.

It must not be supposed, however, that the Kato government will continue to stand by with folded arms in the event that vital Japanese interests in the new war zone, particularly the South Manchurian Railway, are actually assailed. I am informed by one of the most authoritative spokesmen in the cabinet that pillaging along this railway line by defeated Chinese troops, or other open attacks on Japanese property in Manchuria, would be repelled by force.

Nevertheless the government has not yet thought it necessary to reinforce the small contingents of Japanese troops and armed railway guards in Manchuria. These number about 5,500 all told, the greater part stationed in the leased zone of the Laiotang peninsula. Of course these forces could be augmented from Korea over night, and General Ugaki, Premier Kato's Minister of War, has stated that "troops will be ready to march at a moment's notice" if Japanese lives and property are endangered by the fighting Chinese factions.

In view of the former assertive Japanese policy in China, the temperate nature of the present government's attitude may seem surprising. It would have been very easy to give Chang such military support as to make his overthrow by Chinese troops impossible, with the result of bringing Manchuria even more definitely into the Japanese orbit. It would have been possible to impress Great Britain with the argument that armed intervention is necessary in order to keep Manchuria free from the chaos which has overtaken China proper. And our own State Department could with much reason have been informed that to allow the overthrow of Chang is tantamount to the encouragement of Bolshevism in a province already strongly Russianized.

Moreover, there are numerous Japanese, particularly of the old bureaucratic school, who make no bones of their belief that the island empire is throwing away a golden opportunity for imperial expansion. Even men as enlightened as Viscount Goto, former Minister of Home Affairs, declare that "when Japan's special position is menaced," it is folly to maintain absolute neutrality in the affairs of China. General Matsui, a Japanese military adviser of Chang Tso Lin, rushed to Tokio as soon as the latter's defeat became probable and publicly denounced the "blunders" of Premier Kato's Manchurian policy. The Seiyukai, principal opposition party, announces determination to drive the government from office on this issue when the Diet convenes in January, following the formal opening on Christmas Day.

To all such attacks Premier Kato, with a majority of the press behind him, replies that Japan will protect her legitimate interests and not go an inch further. And it may be asserted with confidence that Premier Kato's policy of non-interference in China will be followed by any Japanese government in ensuing months, even if the issue should grow large enough to force a dissolution of Parliament.

The reasons for this notable change in Japanese policy, the dropping of the aggressive note so generally associated with this country by Americans, are complex. There are a number of political factors, among which our exclusion act plays a considerable part, which I shall endeavor to summarize in a subsequent article. At present it is sufficient to chronicle the fact that a distinct change of spirit has come about since the days of the famous twenty-one demands. Nor would that fact, recognized by all competent American observers in Japan, be disproved if what are diplomatically known as "incidents" should force protective action in Manchuria by Japanese troops.

The situation, of course, must not be allowed to gloss the fact that those now in charge of Japan's policy toward China expect in the long run to gain more by pacific than by the old aggressive methods.

But beyond political and economic factors tending toward at least an outward liberalization of Japan's Asiatic policy there is one which requires a visit to this country to appreciate. It is the earthquake of September 1, 1923, and even more the ceaseless expectation of repetition of that disaster.

PROBLEMS OF THE PACIFIC.—In a lecture at Annapolis to midshipmen of the First Class on January 29, Dr. George H. Blakeslee, Professor of His-

tory and International Relations at Clark University, Worcester, Massachusetts, suggested the following three points for discussion:

(1) That if the U. S. Navy is engaged in serious hostilities in the Pacific in the next ten years it will be in defense of American lives and property in the treaty ports of China;

(2) That the greatest possibility of a major war between Pacific powers in the next ten years is between Japan and Soviet Russia;

(3) That even Japan and China combined have not the material resources in coking coal and iron to wage modern war on a grand scale.

In developing the first point, the lecturer called attention to the remarkable development of nationalism in China, to China's demands for abolition of customs control and extraterritoriality, and for return of coastal concessions to Chinese sovereignty. If these demands should not be fully granted by the powers, and if China should proceed to carry them out after the example of Turkey, it might give rise to the situation envisaged in point one.

As regards point two, the speaker suggested that there is today no vital material issue unsettled between Japan and the United States; but between Japan and Soviet Russia, now imperialistic in its dream of eastward extension of soviet rule, there is the great and rich province of Manchuria, nominally Chinese, but in reality a region contested for both economically and politically by the two major powers.

As for the iron and coal reserves of the Orient, the speaker's statements were based chiefly on the opinions of American experts who had made a special study of eastern mineral deposits.

BOOK REVIEWS

BOOK DEPARTMENT

The Institute Book Department will supply any obtainable naval, professional, or scientific book at retail price, postage prepaid. The trouble saved the purchaser through having one source of supply of all books should be considered. The cost will not be greater and sometimes less than when obtained direct from dealers.

Address all communications to: Secretary-Treasurer, U. S. Naval Institute, Annapolis, Md.

INTIMATE PAPERS OF COLONEL HOUSE. Edited by Charles Seymour, Professor of History, Yale University. This book is coming out at present in serial form in certain newspapers through arrangements with Houghton-Mifflin Company, and *New York Tribune,* Inc.

The prefatory note by Colonel House is very interesting, especially so to the Navy that portion wherein he refers to the late President Wilson and their relations prior to our entry in the World War, which states "The President, I believe, represented the opinion prevailing in the country at large, apart from the Atlantic seaboard; and I am not certain, had he advocated the training of a large Army, that Congress would have sustained him. But I am sure, given a large and efficient Army and Navy, that the United States would have become the arbiter of peace and probably without the loss of a single life. When the President became convinced that it was necessary to have a large Navy, Congress readily yielded to his wishes. But even so, it is not certain that had he asked for such an Army as I advocated he would have been successful. The two arms do not hang together on even terms, for building of a great Army touches every nerve center of the nation, social and economic, and raises questions and antagonisms which could never come to the fore of a large Navy program.

H.A.B.

THE GLORIOUS "SHANNON'S" OLD BLUE DUSTER; and Other Faded Flags of Fadeless Fame, by C. H. J. Snider. McClelland and Stewart, Publishers, Toronto. $4.50.

This book, although published a little over two years ago, has an interest for the American Navy, and particularly for all those who are interested in any way in the revolutionary history of the Navy and the stirring days of the War of 1812. As its title indicates, the book deals with the various British trophies and flags captured by American ships during the periods referred to above. The American version of the capture of these

trophies is more or less familiar to all of us, but this book gives the story of the other side. The trophies and flags referred to by the author are those that have been in the collection of the Naval Academy for a great many years. It is hoped to have a very complete review of this book, by Commander Byron McCandless, U.S.N.

An interesting extract from the book is given below and is purported to be a copy of the challenge sent by Captain Broke, of the *Shannon* to Captain Lawrence of the *Chesapeake*. So far as the records show, Captain Lawrence never received this challenge, the *Chesapeake* having come out of Boston harbor before it was delivered:

On the morning of the battle Captain Broke sent into Boston one more challenge, by means of a Captain Slocum, of Marblehead, whose boat had fallen into his hands. From the masthead of the *Shannon* Captain Broke watched the little craft on her journey and saw that the *Chesapeake* was coming out too soon to have received this last challenge. He had, however, every reason to believe that his preceding challenge had produced the result. The wording of the message reflects credit on the sender; he was fair to a fault, overstating, if anything, his own resources, and giving his opponent generous opportunities as to time and place of meeting. Broke did not insist on the battle being fought as soon as the *Chesapeake* rounded the lighthouse. That was Lawrence's choice. The great captain's great letter is thus given:

"As the *Chesapeake* appears now ready for sea, I request you will do me the favor to meet the *Shannon* with her, ship to ship, to try the fortune of our respective flags.

"The *Shannon* mounts 24 guns upon her broadside, and one light boat-gun; 18-pounders upon her main deck, and 32-pound carronades on her quarter-deck and forecastle, and is manned with a complement of 300 men and boys (a large proportion of the latter), besides thirty seamen, boys and passengers who were taken out of captured vessels lately.

"If you will favor me with any plan of signals or telegraph, I will warn you should any of my friends be too nigh, while you are in sight, until I can detach them out of the way. Or I would sail under a flag of truce to any place you think safest from our cruisers, hauling it down when fair, to begin hostilities. Choose your terms, but let us meet. I entreat you, sir, not to imagine that I am urged by mere personal vanity to the wish of meeting the *Chesapeake*, or that I depend only upon your personal ambition for your acceding to this invitation. We have both nobler motives. You will feel it as a compliment if I say that the result of our meeting may be the most grateful service I can render to my country; and I doubt not that you, equally confident of the success, will feel convinced that it is only by repeated triumphs in *even combat* that your little navy can now hope to console your country for the loss of that trade it can no longer protect. Favor me with a speedy reply. We are short of provisions and water and cannot stay long here."

H.A.B.

THE METALLURGY OF ALUMINIUM AND ALUMINIUM ALLOYS. By Robert J. Anderson, B.Sc., Met.E. New York City: Henry Carey Baird and Company, Inc. $10.

REVIEWED BY COMMANDER R. D. WEYERBACHER (CC), U. S. NAVY

This book is a welcome addition to the literature of aluminum, and although it has certain defects, it is a very comprehensive volume. In

some respects, this book is the only one published where you can get an equal amount of information. At the end of each chapter, there is a very good bibliography, and I would say that this part of the book is probably its most valuable feature. The author states in the preface that, "The present work may be regarded as the result of the author's investigations in the metallurgy of aluminum and aluminum alloys, and considerable original experimenting data are included." The book is largely made of references to existing literature, rather than from the author's own investigation. He shows great ability for gathering together all sorts of public information, but unfortunately, compilers are seldom able to sift the wheat from the chaff.

A trivial criticism may be made as to the spelling of the word "aluminium," even in quoting American references, in which the original spelling was "aluminum."

When you get into that part of the book which may be termed the metallurgical part, such as metallography and manufacturing, the book requires more detailed consideration. The author is primarily a metallographist and necessarily, his discussion on the metallographic side of the work is more full and complete, and represents the present development of that rather limited field of metallurgy. When it comes to the manufacturing end, however, I feel that the author is no help to the man who is in trouble and is seeking information, or who is seeking information and may not be in trouble. He has filled his book with a lot of padding, and has put a lot of trivial information into it that will confuse the man who seeks information, and exasperate the man who does not seek information but reads it for entertainment.

The subject matter in many parts of the book is obselete; and not up to date on such subjects as aluminum silicon alloys, strong heat treated wrought alloys, and the strong heat treated cast alloys of aluminum.

To sum up, the book is a fund of information particularly with regard to its references, and therefore, it is of value to the research worker. It is also probably the best book that is published today containing so much information, but it has some glaring weaknesses that make it unsuitable for students, and engineers consulting the book should read it with a discerning mind. It is noted that in the author's index, there are no references to the meritorious articles contributed by Dr. Jeffries.

NOTE: The use of aluminum and its alloys by our naval personnel is rapidly increasing. It is now being used by our aeronautical engineers and the field is growing. Owing to the limit on tonnage of naval vessels, these materials are now being considered by our naval constructors. The corrosion of aluminum alloys presents a very complex problem, and, up to the present, it has not been satisfactorily solved. Our designers must use this material with care, designing all parts so that they may be readily accessible for inspection, and operating personnel must be indoctrinated with—"how to care for this metal." At the present time, the best protective coating is bitumastic solution.

REPORT OF[1] NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS, 1925

THE PRESENT STATE OF TECHNICAL DEVELOPMENT

AERODYNAMICS.—Satisfactory progress has been made in the science of aerodynamics during the past year. It is gratifying to note that this progress not only includes the development of basic theories of air flow but also the practical applications of these theories. In the latter field the recent progress has been rapid and still further practical applications may confidently be expected. The most notable example of the recent adaptation of theory to practical problems is probably to be found in the Prandtl-Munk equations, which enable the drag of any system of wings to be calculated from monoplane-test data.

The progress which has been made in the technique and interpretation of wind-tunnel tests closely parallels that made in pure and applied theory. In particular, the limitations of the atmospheric wind tunnel, the corrections which must be applied for the interference between the model and the tunnel walls, the requirements which must be met in model construction, and the securing of full scale data are problems which appear to have been successfully solved, and the solutions will have an important influence on wind-tunnel investigations in the future. One important result of wind-tunnel investigation has been the development of a number of remarkably efficient wing sections of adequate thickness for economical structures. It is desirable that this development continue substantially along the present course.

There has recently been made available through the various research laboratories and organizations a large volume of airplane propeller data obtained from systematic tests in which all of the major elements of design are treated. These tests determine the effects not only of blade interference, blade shape, camber, pitch-diameter ratio, and so forth, but also of interference between the propeller and objects in its slip stream. The knowledge of interference effects is of value to the propeller designer, since it enables him to obtain satisfactory results from a single design instead of following the cut-and-dry methods involving from three to six designs. While the progress in propeller design has been rapid, there is considerable information yet to be obtained. This information is of such nature that it is best obtained from full-scale tests either in free flight or in a suitable wind tunnel. Considerable free-flight work has already been done and arrangements have been made to supply facilities for full-scale wind-tunnel tests.

A careful study of the present state of knowledge in aerodynamics discloses a number of lines along which future investigations must be carried out. The most important of these will be described briefly.

More knowledge must be obtained on the forces on an airplane in various maneuvers in order that an efficient structure may be designed to carry these loads. The distribution of the loading is particularly important. For example, free flight, pressure distribution tests have shown the resultant forces to be substantially those used in design, but, owing to surprising irregularities in distribution, the local loadings sometimes are more than

[1] EDITOR'S NOTE.—This is but a portion of complete report.

twice as great as the maximum values used in design. A large field for research lies along this line.

The subject of control of airplanes in flight is of primary importance, not only from the standpoint of adequate strength of the control surface, but also from the consideration of adequate control. Several cases of failure of control surfaces have occurred in flight during the past three years. Service operation and flight tests have revealed high local loadings in certain maneuvers on airplanes of the pursuit type. This knowledge is now being applied to current designs, but more information is required.

In regard to the inadequacy of control, the limitations imposed by the inherently indefinite nature of the problem make its solution difficult. It is difficult to define adequate control just as it is difficult to define controllability or maneuverability. Every pilot and every engineer can perhaps find a definition which answers his own requirements, but universal agreement cannot be expected. However, the problem can be resolved into three general divisions, as follows:

(1) Control and design characteristics, that is, relations between control and the design characteristics such as the span, chord section, and arrangement of the wings, the location of the center of gravity, the size and location of tail surfaces, the size and shape of the fuselage, and so forth: Valuable work has been done along this line, but a thorough systematic research is needed.

(2) Controllability and maneuverability: Some airplanes are readily maneuvered into any desired position with very slight effort on the part of the pilot. Other airplanes differing but slightly in general appearance either can not be so maneuvered, or else require considerable effort on the part of the pilot. A few of the factors which affect controllability and maneuverability are known, but more complete information is necessary unless the design of pursuit airplanes is to remain an art instead of developing into a science.

(3) Control at low speeds: This is a matter of vital importance for commercial aviation. The subject is now receiving concentrated attention abroad, and considerable work has been done in this country. Recent progress has been of such a nature that several solutions now appear available. The goal of the engineer is, of course, to free the airplane entirely from the danger of a crash due to loss of control following a stall at low altitudes. Two methods of attack are available—one to prevent the stall, the other to provide adequate control of the airplane in the stalled condition.

The problem of wing or control surface flutter seems to have been satisfactorily solved through wind tunnel tests, both as to causes and as to prevention. The primary cause appears to be one of relative stiffness or flexibility, and by a suitable proportion of stiffness in any particular case, flutter may be prevented. However, its complete elimination is not to be expected until an exhaustive treatment is made available to designers who will take the necessary precautions in design.

Another subject of considerable importance is the limitations imposed on airplane performance by the design requirements. These limitations are not as widely known as they should be. Consequently, some designers may claim unreasonable performance for their designs because they have failed to take into consideration certain very important requirements, such as adequate structural strength and stiffness. A clear and complete statement of design requirements should be prepared for the information of all designers. Under the present arrangement most of the needed information is available but not in a convenient form.

AIRPLANE STRUCTURES.—*Trend of design.*—While neither the monoplane nor biplane has gained complete acceptance for any particular use during the past year, out of an increasingly clearer understanding of the relative

advantages of the two types there has grown an increased tendency toward standardization. For high speed, either for racing or for pursuit airplanes, the biplane has steadily gained in favor until it dominates that field almost completely, notwithstanding the fact that a monoplane holds the world's record for straight-away speed. Structural difficulties with the monoplane, and particularly the danger of wing flutter, have been largely responsible for its decreased popularity where great speed range is desired. Experience seems to show that for general pursuit use, having regard to the importance of maneuverability and the minimum obstruction of the pilot's vision, a biplane with the lower wing considerably smaller than the upper has proven most successful.

The larger military airplanes are of the biplane type in most cases, partly because of the greater compactness of the biplane of a given area and weight. For naval service especially the last consideration is of vital importance.

For commercial service both monoplanes and biplanes are used, the latter having, in general, the advantage in maneuverability and in compactness of form, but suffering somewhat in aerodynamic efficiency by comparison with the single-wing type. Where speeds are low and efficiency is the primary requirement, as on the lines of central and western Europe, the monoplane controls the field. The monoplanes now in use are either of all-metal construction or fitted with winds covered with plywood.

In the light airplane the importance of efficiency is such that monoplanes and biplanes of very high aspect ratio have given the best results, the former being in the majority. Aspect ratios in this type of airplane, although well above the average for military machines, are, because of the importance of weight in the light airplane, much lower than had become common in glider construction. There is a general tendency to increase aspect ratios and use thicker airfoil sections in all types, and, except in England, the airfoil section having a maximum thickness of less than 0.09 of the chord has virtually disappeared.

Structural materials.—Metal construction of airplane wings has developed much less rapidly in America than in European countries. The practice of any nation in the design of military airplanes is largely governed by the nature of the materials readily available. In America, with large native spruce forests, wooden wing spars are used in most instances, although there is a steadily increasing interest in metal. In Great Britain steel is commonly employed, while in France, which has native resources for the production of aluminum, duralumin is almost universally employed for wings and fuselages. In Germany duralumin holds first place. Metal covering is little used outside of Germany, where it is universally used.

Fuselage construction is of metal in practically all cases because of its greater durability and better shock absorbing qualities in case of a crash. In America, the Netherlands, and some of the smaller European countries, fuselages are commonly constructed of steel tubes assembled by welding. British practice has also inclined toward steel tubes, but with assembly by pinned fittings, while most of the important continental manufacturers use duralumin, either in tubes or structural forms.

When metal is used in wing construction it may take the form of simple tubes, or, as is the common practice in Great Britain, the alloy steel of thin sheet may be rolled into somewhat complex forms and assembled into spars by riveting.

In landing-gear construction the outstanding development of the year in America has been the trial and rapid recognition of the value of the Oleo gear for shock absorption. Such gears reduce the liability to bouncing and at the same time increase the efficiency of shock absorption and the violence with which the airplane can be brought into contact with the ground without damage.

Small floats are still commonly made of wood, although duralumin is sometimes used. In flying-boat hulls, metal is steadily increasing in popularity, as it has been found that seaworthiness can be improved and the weight decreased. The *PN-9* flying boat which attempted the Hawaiian flight and had to cruise on the surface of the water for a number of days was fitted with a metal hull.

AIRCRAFT ENGINES.—Progress in aircraft engines development in this country is reflected in the fact that we now have proved engines in horsepowers ranging from 60 to 800. In the 60-horsepower class there is the Lawrance 3-cylinder radial "L" type. In the 200-horsepower class there are available the Wright model "E" water-cooled and the Wright model "J" air-cooled engines.

In the 300-400 horsepower field the Curtiss D-12, a 12-cylinder water-cooled engine, is in production and has given excellent performance, particularly in pursuit type airplanes. In the 400-500 horsepower field we have the Liberty, Packard 1A-1500, and Curtiss V-1400 engines. The two Packard 1-1500 engines, with a gear ratio of 2 to 1, formed the power plants for the two *PN-9's* on the west-coast-Hawaiian flight project. The Curtiss V-1400 engine was installed in the Pulitzer and Schneider cup racers. It gives every indication of being an extremely light and rugged engine.

The Wright model P-2 is now undergoing its dynamometer trials and is giving very satisfactory results. This is a 9 cylinder radial air-cooled engine of 450 horsepower at 1,800 revolutions per minute.

In the 500-600 horsepower class the 12-cylinder T-3 water-cooled engine meets the present requirements. This engine in the past year has been extensively used by the Navy in the three-purpose scout-torpedo-bombing airplane.

In the 600-800 horsepower class the Packard 1A-2500, a 12-cylinder water-cooled engine, has been flown in the PB-1, the Navy's west coast-Hawaiian airplane built by the Boeing Airplane Company, and in the latest Army and Navy bombers.

The Curtiss radial 400-horsepower 9-cylinder air-cooled engine is undergoing its tests at McCook Field. It gives great promise as a light-weight engine.

In the past year strides have been made in the matter of reliability and increased service between overhauls. A life between overhauls from two to four times as great as has been had in previous engines is now being obtained by the Wright model "J" and T-3 engines.

The aeromarine inertia starter has solved the starting problem and is in wide use in the Navy.

AIRSHIPS.—During the past year there has been no new airship construction started in the United States. The technical development of airships has necessarily been confined to experimental investigations and research looking toward the improvement of existing airships.

With the completion of the *RS-1* semi-rigid airship, constructed for the Army Air Service by the Goodyear Tire and Rubber Company, the Army Air Service now has in its possession the largest semi-rigid airship in the world. A special subcommittee on the *RS-1* appointed by the National Advisory Committee for Aeronautics to report on the design and construction of semi-rigid type airships has made its report.

The technical development of airships lags considerably behind that of airplanes. There appear to be two reasons for this—the higher cost of airships, and the longer time taken for construction of airships.

The arrival in the United State of the *ZR 3*, now the U.S.S. *Los Angeles*, on October 15, 1924, after an epoch-making non-stop voyage of 5,600 miles in 81 hours, made the United States the possessor of two rigid type air-

ships. The *Los Angeles* is a splendid example of modern airship design and construction.

In October, 1924, the U.S.S. *Shenandoah* successfully completed a 9,000-mile voyage from Lakehurst to Seattle and return. The airship remained away from her shed almost 20 days, basing on mooring masts, and during the period encountered unfavorable weather. The successful completion of the voyage proved the efficiency of the mooring masts, the soundness of construction of the *Shenandoah*, and the skill of her operators.

The loss of the *Shenandoah* on September 3, 1925, while on a voyage to the middle west, was a severe blow to airship development. At this time the cause of the accident has not been determined, and it is hoped that the naval court of inquiry, after sifting all the evidence, will be able to determine the cause of the accident.

The past few years the United States has led the world in experimental research with reference to improved design and operation of airships. The United States has now lost its position to Great Britain, which during the past year has actively pursued research and experimental problems and started the construction of two 5,000,000-cubic-feet rigid airships, one being built by the government and one by a private manufacturer.

During the past year, however, progress has been made in determining the magnitude of stresses which may be encountered by airships in flight. in June, 1925, preliminary strain-gauge measurements were made on the *Los Angeles* in conjunction with the use of a rate-of-turn indicator. It is proposed to extend this work and in addition to conduct simultaneous pressure-distribution measurements in an effort to fix some relation between aerodynamic loads, magnitude of stress in important structural members, and acceleration in a horizontal or vertical plane as shown by a rate-of-turn indicator or sensitive accelerometer mounted in the airship's control cabin.

Further confirmation of existing design theories has been found through the extended tests carried out on a photoelastic model of the structure of a rigid airship at the Massachusetts Institute of Technology.

The behavior of duralumin and other light alloys under conditions likely to be encountered in airship practice has been investigated. Special study has been given to corrosion or deterioration of these alloys from various causes and possible means for preventing such corrosion or deterioration.

Water recovery apparatus has been improved in type, and with this improvement has come a considerable reduction in weight.

Study has been continued on substitute materials for the expensive goldbeater's skin heretofore considered necessary in gas-cell construction. One type of substitute fabric gave so much promise of success that the Navy Department constructed an experimental full-sized cell for test.

In accordance with legislation recently enacted, the Bureau of Mines, Department of Commerce, on July 1, 1925, took over the control of all matters affecting the conservation and production of helium, including operation of the helium production plant at Fort Worth, Texas, heretofore operated by the Navy Department. Attention has been given to lowering the cost of helium transportation and the Army Air Service and the Navy Department have each purchased a tank car for transporting helium. Each car will carry about 215,000 cubic feet of helium, and the saving in freight charges for a period of about two years will practically pay the cost of the tank car.

Experimental work has been continued toward the development of better means of handling large airships in and out of their sheds and while near the ground. The progress made promises the further development of methods which will materially reduce the number of men required for a handling crew. The success obtained with mooring airships both to stationary masts and to the floating mast on the U.S.S. *Patoka* has been gratifying.

AERONAUTICAL RESEARCH IN THE UNITED STATES

The National Advisory Committee for Aeronautics is charged by law with the supervision and direction of the scientific study of the problems of flight, with a view to their practical solution. The committee is authorized by law to direct and conduct research and experiment in aeronautics in such laboratories as may be placed under the direction of the committee. The membership of the committee and of its technical subcommittees is drawn from the governmental agencies concerned and from private life. The members of the main committee and of all subcommittees serve as such without compensation. It is a matter of gratification that since the creation of the committee no person has ever declined an invitation to serve as a member of either the main committee or one of its subcommittees. The committee has therefore been able to draw upon the best talent in America for the study of the fundamental problems of aeronautics, and in this way it has wielded an influence for the advancement of the science of aeronautics that could not have been secured in any other way. This has been done at the direct cost to the government that involved only the traveling expenses of the members and the maintenance of a place for meetings.

The way the influence of the National Advisory Committee for Aeronautics is exerted is through discussion by each subcommittee of the new technical problems that are constantly arising in aeronautics, and the preparation of research programs from time to time, which programs invariably indicate the particular laboratory where each investigation recommended can be conducted to the best advantage of the government. Investigations are assigned both to public and private laboratories in a way that makes for the most effective utilization of existing facilities and the most effective study of the problems. After approval by the main committee, estimates for the prosecution of the research programs are submitted to the Bureau of the Budget, and after the appropriations are made by Congress the investigations are pursued under the general cognizance of the executive committee. The more fundamental investigations, for which facilities do not exist elsewhere, are undertaken in the committee's own laboratory, known as the Langley Memorial Aeronautical Laboratory, located at Langley Field, Virginia, on a plot of ground set aside for the purpose by the Secretary of War, and on which the necessary buildings have been erected by the committee with appropriations provided for the purpose by the Congress. Other investigations are assigned, for example, to the Bureau of Standards, to the Forest Products Laboratory, to the Weather Bureau, to the Engineering Division of the Army Air Service, to the Navy, and to various universities having the requisite facilities for the proper study of the particular problems so assigned. This method has proved practical and successful in operation, and has led to the accomplishment of substantial results with a maximum of economy and efficiency.

The committee was created by Congress with the status of an independent government establishment. It is a service organization, ministering to the needs of the Army, Navy, and Air Mail Service, as well as to the needs of commercial aviation. By virtue of its status, it has been able to initiate and conduct fundamental scientific investigations while at the same time responding to numerous requests from the War and Navy Departments for special investigations in aeronautics.

The committee enjoys many advantages which have contributed to its success. Chief among these may be mentioned the following:

1. The members of the National Advisory Committee and of its standing subcommittees serve without compensation, thus enabling the government to obtain the services of men who would not otherwise be available for government service.

2. The committee has the status of an independent government establishment, and by virtue of such status reports directly to the President, receives

its appropriations direct from Congress, and is enabled to initiate and conduct investigations of a truly scientific character, limited only by the funds available.

3. The research laboratories of the committee are located on a flying field, where all phases of the work, including flight operations, are controlled and actually performed by the committee's own technical staff, thus bringing theory and practice together under ideal conditions.

4. The committee has the confidence and support of the Army and Navy Air Services, and is able at all times to obtain any cooperation desired.

The committee has just completed its tenth full year of activity. While the satisfaction of useful service rendered is ample reward, the committee feels especially grateful to the President for his recognition of its services, expressed in his message to Congress transmitting the tenth annual report of the committee on December 8, 1924. It is therefore with pardonable pride that the committee quotes the following extract from that letter of President Coolidge, addressed to the Congress of the United States:

I concur in the committee's general recommendations, and agree that in the last analysis substantial progress in aviation is dependent upon the continuous prosecution of scientific research.

When the National Advisory Committee for Aeronautics was established by Congress in 1915, there was a deplorable lack of technical information on aeronautics in this country. In submitting this, the tenth annual report of the committee, I feel that it is appropriate to say a word of appreciation of the high-minded and patriotic services of the men who have faithfully served their country without compensation as members of this committee and of its subcommittees. Through this committee the talent of America has been marshaled in the scientific study of the problems of flight, with the result that today America occupies a position in the forefront of progressive nations in the technical development of aeronautics. The status of the committee as an independent government establishment has largely made possible its success.

CALVIN COOLIDGE

RELATION OF AERONAUTICAL RESEARCH TO NATIONAL DEFENSE

The relation of aeronautical research to national defense is direct, and its relative importance is increasing. This is necessarily so, because every improvement in the performance of aircraft makes the probable rôle of aviation in warfare greater. As the relative importance of aviation increases, it becomes more and more desirable for America to achieve and maintain leadership. As leadership can not be attained in all respects, it becomes of the greatest importance for America to lead in technical development. For ultimate leadership in time of emergency the United States must depend on the results of continuous research and development.

The National Advisory Committee for Aeronautics therefore believes it to be its duty to emphasize the importance of scientific research as the most fundamental activity of the government in connection with the development of aeronautics. Closely associated with this is the problem of engineering development of aircraft to meet the special needs of the military and naval services.

While the committee is of the opinion that there should be no monopoly of engineering development, either by the government or by the industry, it believes that it is desirable, in order to secure the best results, that the actual users of military and naval aircraft should be in close touch with competent aeronautical engineers. As a practical proposition, this can be done only if there are such engineers in the Army and Navy Air Services who are in such close touch with the operators that the latter are able to offer them constructive criticisms in regard to engineering problems. This

would enable the aeronautical engineers of the industry to thoroughly understand the problems presented to them and would prevent them from wasting their energies in attempting to develop military types of airplanes which would not meet the requirements of the services.

Without attempting to be specific, the committee is of the opinion that the military and naval services should maintain aeronautical engineering divisions which should be charged primarily with the formulation of specifications of military aircraft, their characteristics and performance; with the critical examination and testing of designs and of aircraft offered by the industry; and with such experimental and development work as can be carried on by them most effectively and most economically.

THE GENERAL PROBLEM OF AERONAUTICAL ORGANIZATION

In its tenth annual report, for the year 1924, the National Advisory Committee for Aeronautics presented an outline of the organization and functions of the four governmental agencies directly concerned with the use or development of aeronautics—namely, the Army Air Service, the Naval Bureau of Aeronautics, the Air Mail Service, and the National Advisory Committee for Aeronautics.

During the past year, there have been two major investigations of the aeronautical situation—the first by the Congressional Select Committee of Inquiry into Operations of the United States Air Services, created by Resolution Number 192 of the House of Representatives (Sixty-eighth Congress, first session), of which Representative Florian Lampert, of Wisconsin, is chairman; the second by the special board appointed by President Coolidge on September 12, 1925, known as "The President's Aircraft Board," of which Mr. Dwight W. Morrow is chairman. The investigations of the two bodies referred to have gone deeply into all phases of aeronautical activity and governmental organization in aeronautics, including the major problems of the relation of aircraft to national defense; the organization, morale, and sufficiency of air personnel; the maintenance of the aircraft industry; the regulation, and encouragement of commercial aviation; the development of airways, and so forth.

It is to be hoped that the recommendations of these two investigating bodies will receive careful consideration and lead to a settlement of the controversies in aeronautics that have existed since the war. The continued unrest in aeronautical circles has served to focus attention primarily on organization and administrative matters, but has also indirectly brought about a broader recognition of the increasing relative importance of aircraft for purposes of war and of commerce.

In the judgment of the National Advisory Committee for Aeronautics, however, the people of the United States are not so much concerned with the form and administration of the government's activities in aeronautics as they are with the question as to whether practical and efficient results are being secured. It is only fair to say that the best results have not been obtained and will not be obtained as long as the personnel are disturbed and their attention distracted from their real duties. It is most desirable, therefore, that measures to improve the situation be formulated and carried into effect without delay. This will enable all who have the best interests of aeronautics at heart to cooperate and settle down to work in harmony with that full measure of devotion to duty which is necessary to bring about the greatest practicable development of aeronautics in America, for both military and commercial purposes.

PROGRESS IN COMMERCIAL AVIATION

The past year was notable as witnessing what may prove to be a real, substantial beginning of commercial aviation in America. The most encouraging factors were the initiative shown by private companies in estab-

lishing air lines and the relatively large number of responsible bidders for the carrying of air mail by contract with the Post Office Department. When it is realized that commercial aviation exists in European countries at this time only by virtue of the support of the various governments given through various plans of direct and indirect subsidies, it should be especially gratifying to all concerned with the advancement of aeronautics in this country to feel that the era of commercial aviation on a sound basis is about to dawn in America.

Although the National Advisory Committee for Aeronautics has long been of the opinion that commercial aviation must largely make its way in America, it believes at the same time that the government should aid commercial aviation in certain respects where government aid is practicable and necessary. If, in recognition of this principle, commercial aviation can be successfully developed in America on a firm basis, its development will not be limited, whereas the development of European commercial aviation on a direct subsidy basis is necessarily limited by the nature and extent of the subsidies given. The committee believes that the American policy is sound and in the long run will be more effective in stimulating the substantial development of commercial aviation than will the European policy of direct subsidy.

In spite of this optimistic note, the facts of the situation that must be faced show a number and variety of problems requiring study and solution before commercial aviation can take its proper place in America. The most pressing needs requiring attention at this time are, first, legislation establishing the fundamental right of flight, creating a bureau of air navigation in the Department of Commerce for the regulation and licensing of aircraft, airports, and aviators, and for the establishment, maintenance, and lighting of adequate national airways, and providing for the necessary meteorological information; and, second, the improvement of airplane design and structure with a view primarily to making airplanes safer, more reliable, more controllable at low speeds incident to taking off and landing, and less expensive in initial cost, as well as in the cost of maintenance and operation. There should also be assistance from the other governmental agencies concerned, such as the Hydrographic Office, the Coast and Geodetic Survey, the Weather Bureau, the Lighthouse Service, and the Army and Navy Air Services.

To accomplish the first purpose, legislation is necessary. This has been repeatedly recommended by the National Advisory Committee for Aeronautics and has been indorsed in principle by all agencies of the government concerned. This question is discussed at length in the report of the committee on civil aviation of the Department of Commerce and American Engineering Council. To acomplish the second purpose requires continuous prosecution of scientific research on the more fundamental problems of flight. This is the definite prescribed function of the National Advisory Committee for Aeronautics, and in the last analysis is necessarily the most fundamental activity in the whole field of aeronautics.

In the past the committee has devoted its attention primarily to the solution of problems arising from the development and use of military and naval types of airplanes and, to a lesser extent, airships. While the basic problems of aerodynamics and of design are the same for military and commercial airplanes, the service requirements as to performance, efficiency, and safety differ. Up to the present time airplanes used for commercial purposes in America have been largely adaptations of military types. This is best evidenced by the fact that the Air Mail Service is still using up war-time *DH-4* airplanes with certain modifications.

The committee is of the opinion that with the advent of commercial aviation, a new series of problems peculiar to commercial aircraft will be presented. The committee has therefore decided to hold one or more meetings annually with the engineering representatives of aircraft manufacturing

and operating industries, with a view to ascertaining definitely the problems deemed of most vital importance and to incorporating the same, as far as practicable, into the general research programs prepared by the committee.

THE PROBLEM OF THE AIRCRAFT INDUSTRY

In its tenth annual report, the committee outlined the relation of the aircraft industry to national defense, and emphasized the need of maintaining a satisfactory nucleus of an industry. This was defined as "a number of aircraft manufacturers distributed over the country, operating on a sound financial basis, and capable of rapid expansion to meet the government's needs in an emergency." The committee presented certain definite suggestions of steps to be taken by the government and by the industry to meet the situation that existed at that time. There has been substantial progress during the past year along the lines outlined by the committee, and it is believed that the condition of the industry and the relations of the government to the industry have been much improved. The greatest single factor in bringing about this improved condition has been the increased volume of government orders for aircraft, made possible by increased appropriations and contract authorizations for the purchase of aircraft. The present situation, on the whole, may be regarded as more satisfactory at this time, and as offering promise of further improvement.

THE AIRSHIP PROBLEM

Airships are of three types: Rigid, semi-rigid, and non-rigid. The value of airships for military or commercial purposes has not as yet been conclusively demonstrated. It can not be said, however, that they are without value, nor that they have no further possibilities than have already been demonstrated. The fact of the matter is that all types of airships are in the experimental stage of development. The recent regrettable loss of the rigid airship *Shenandoah* has been urged as a reason for the government's abandoning airship development, or at least rigid airship development, on the theory that rigid airships will never be practicable.

The committee fully appreciates the seriousness of the airship situation and believes that despite all that has been done in many countries to develop airships, they are still rather delicate structures. The conclusions of the naval court of inquiry as to the causes for the destruction of the *Shenandoah* have not yet been made public. Regardless, however, of the actual technical causes, the committee is of the opinion that it would be a serious error at this time to adopt a policy of merely marking time in the development of airships. In the judgment of the committee, the time has come to decide to do one of two things, viz., either to carry on with the development of airships or to stop altogether.

The development of rigid airships in America for military and naval purposes has, by joint agreement between the War and Navy Departments, been entrusted to the Navy. The question of continuing their development, however, is not altogether a war problem, for airships of all types have probable applications also for commercial purposes. The question, therefore, whether the Navy should continue with the development of rigid airships at this time should not be determined solely upon considerations of their probable naval usefulness. The Army is directly concerned and the commercial development of airships in America may be said to be also at stake. The problem is therefore a national one. Viewed as such, the Navy becomes, in a peculiar sense, the agent of the whole people in the development of rigid airships. In the last analysis, however, it is for the Congress to determine America's policy with regard to continuing the development of airships. As between the two alternatives of carrying on or stopping altogether, the National Advisory Committee for Aeronautics, after careful consideration of the matter, is of the opinion that the development of airships should be continued.

SUMMARY

There has been continued gratifying progress in the technical development of aircraft. Performance and reliability have increased. The committee's program of research for the coming year promises to add substantially to the store of technical knowledge. There is nothing in sight at this time to indicate the probability of the discovery of a revolutionary principle contributing any great or sudden improvement in aircraft. While progress must be gradual, there is every reason to believe that there will be steady improvement in the performance, efficiency, reliability, and safety of aircraft.

Aviation has become more generally recognized as a weapon indispensable to war operations and as an instrument that gives promise of taking its place in the immediate future in the commercial life of the nation.

During the past year alone there were three investigations of the aircraft situation. A special committee of the House of Representatives known as the "Lampert Committee," and a special board appointed by President Coolidge known as "The President's Aircraft Board," inquired into all details of the aircraft situation and the aeronautical organization of the government. A third investigation, limited to civil and commercial aviation, was made by a special committee on civil aviation of the Department of Commerce and American Engineering Council. The recommendations of these bodies should serve to clarify the public mind and to focus attention on the major problems requiring immediate solution. Measures to meet the situation should be formulated and carried into effect without delay. In this connection the National Advisory Committee for Aeronautics reiterates its recommendations of previous years for the creation of a bureau of air navigation in the Department of Commerce to regulate and encourage commercial aviation.

The state of the aircraft industry is gradually improving. The most substantial factors in improving the situation during the past year were the increase in appropriations and contract authorizations for the purchase of aircraft by the War and Navy Departments and the increasingly close liaison between the industry and the government engineers. With sustained government patronage on a continuous production basis and with the prospect of a growing commercial demand for aircraft, the condition of the aircraft industry will steadily improve.

Air mail service is no longer a novelty. It is passing out of the experimental stage and becoming a necessity in the daily business life of the nation. It has reached the point where it has become practicable for private firms to carry air mail under contracts with the Post Office Department. Air transportation of the mails should therefore be extended gradually to meet the requirements of the people in all parts of the country.

CONCLUSION

The committee is of the opinion that America is at least abreast of other progressive nations in the technical development of aircraft for military purposes. The committee is grateful to the President and to the Congress for the support that has been given to scientific research in aeronautics. The committee feels that the continuous and systematic study and investigation of the basic problems of flight is the most fundamental activity of the government in connection with the development of aeronautics and that the continuance of this work will serve to keep America at least abreast of other progressive nations in the technical development of aircraft for all purposes.

Respectfully submitted,

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS,
JOSEPH S. AMES, *Chairman, Executive Committee*

GOVERNMENT'S NEW RADIO POLICY

Below is the new tentative policy as regards Radio now being tried out in the government departments concerned.

1. Introductory

The following statement of policy gives only general principles. In dealing with any specific situation, the application of these principles may be so manifest that the particular situation under consideration may be decided without the necessity for conference and compromise. In all other cases the parties at interest should confer, preferably through the interdepartmental organization hereinafter provided for, and arrive at decisions based upon these principles.

2. Interest of the Government in Radio Communication

The government's interest in radio communication is paramount for national defense. The government is charged with the regulation of radio communication as a means for rendering a public service. The government uses radio communication in the administration of its business.

Appendix I contains illustrations of the ways in which the several government agencies are concerned with radio communication.

Appendix II contains illustrations of the ways in which private interests are concerned with radio communication.

3. Coordination of Government Radio Facilities

Coordination of government owned and operated facilities must take into consideration the authority of the several departments and governmental agencies interested, and such coordination is exercised by the President aided by a coordinating agency in which the interested departments and governmental agencies have representation. This coordinating agency shall consist of representatives of all the departments of the government and of such other governmental agencies as have sufficient interest in radio to warrant their participation. The functions of this committee shall be as provided herein.

4. Regulation of Private Radio Facilities

In order that the greatest good may be accomplished with the minimum of interference and conflict in the utilization of radio facilities, it is necessary that such utilization be regulated and coordinated. Regulation of privately owned and operated radio facilities is by law laid upon the Department of Commerce. In order that such regulation may be coordinated with government utilization, the Department of Commerce should exercise its regulative function in conformity with the principles herein set forth.

5. Government Encouragement to Private Radio Enterprises

The government will encourage and foster the development of privately owned and operated radio facilities in such a manner that in time of war or similar national emergency there shall be available the most effective system for the national defense. In part, this encouragement shall consist of utilizing the services of commercial stations wherever government inter-

ests warrant in the accomplishment of the service required. Government stations shall not solicit nor, except in an emergency, shall they accept non-government radio traffic from non-government stations where commercial radio stations can handle it satisfactorily. The government, on the other hand, will facilitate the use of its service by non-government interests whenever such employment does not interfere with the government business, and where non-government radio systems are not prepared to render an approximately equivalent service.

6. Prerogative of Government Departments as to Radio Policy

Subject to the limitations stated herein and to such instructions as may be issued by the President, each of the executive departments shall be the sole and final judge as to its own policy in respect to radio matters; shall determine its own mission; and decide upon the steps toward executing such mission. Such decisions shall include the questions of location of stations, power output, apparatus to be installed, service to be rendered, the capital investment and operating details.

7. Coordination between Government Departments

Before deciding upon any chages in location or services rendered, each department shall ascertain through the existing interdepartmental coordinating organization how such proposed changes will affect the interests of any other department, and shall, in its decisions, give to the suggestions from other departments careful consideration, in order that the final results will produce a government radio system designed to meet the needs of the federal government as a whole in war as well as in peace.

8. Extension of Services to Other Government Departments

The use of government radio facilities shall be extended by the department operating such facilities to other departments of the government insofar as can be done without impairing the efficiency of the service of the operating department, subject to its regulations. If the additional traffic can be handled with the funds and personnel available to the operating department, no charge will be made for such service. If the traffic offered requires personnel and funds beyond the resources of the operating department, the expenses will be shared by the beneficiaries on a basis mutually agreeable to the departments concerned.

9. Utilization of Existing Communication Facilities

No department shall erect a new station in the proximity of an existing government station, unless the same is incapable of rendering to such department the service that it requires, which shall be determined only after careful consideration by the departments concerned or by the permanent interdepartmental organization. Whenever practicable, such a situation shall be met by the expansion of the existing stations, if necessary under joint contribution of the departments interested. No department shall close a station no longer needed by it which is serving other government departments without first making arrangements in respect to such service that are satisfactory to the department being served. If no agreement can be reached through the interdepartmental coordinating organization the matter must be appealed to the Chief Coordinator and, if necessary, through the Director of the Budget, to the President.

10. Joint Contribution Agreement

Where stations are operated under joint contribution agreement, such agreements shall provide that one of the departments concerned shall exercise the responsible control. It is considered undesirable to mix

civilian and enlisted operating personnel, particularly at stations so situated that resident quarters have to be provided on the station reservation for such personnel.

11. Function of the Interdepartmental Organizations

Measures to prevent interference; the assignment of frequencies within the allotted wave bands; determination of the character of broadcast material, and other radio matters of common interest to all departments, shall be determined through the permanent interdepartmental organization. Departments which operate radio stations shall give priority to calls of distress and to other messages concerning safety of human life or marine or aerial navigation, but shall otherwise determine priority of service and other features involving the details of traffic.

12. Coordinated Supervision of Government Radio Facilities

Cooperation and coordinated supervision as prescribed under paragraph 3 above is, under existing circumstances, the only practicable means of realizing the highest degree of efficiency in the utilization of government radio facilities. The coordination at present exercised through the Interdepartment Radio Advisory Committee is advisory; it provides an effective means of investigation and presentation of pertinent facts for consideration by the President, of the merits of any case which requires his action.

13. Centralized Supervision of Government Radio Facilities

Centralized control of government radio communications, by means of consolidation or otherwise, is not at present either practicable or desirable. The requirements of the several operating departments differ so radically that no one department can completely fill the needs of another without an unreasonable increase of federal expenditures. Those departments which are now users but not operators of government owned facilities can have their requirements supplied in large measure by the present operating departments, but conditions may arise where it may be necessary to provide installations where none now exist and which are not required by the present operating departments.

14. Settlement of Questions between Government Agencies Relative to Radio Communication

Where only two agencies are concerned in any question arising, such question or questions can best be settled through direct conference. In all other cases settlement should be reached through the instrumentality of the interdepartmental organization.

15. Radio Communications as an Element of National Defense

Insofar as radio communication is an element of National Defense, the same shall be under the control of the War and Navy Departments jointly exercised through such agency as may be established by these departments. The recommendations of the Joint Board Serial Number 183, dated January 16, 1923, are approved. For information, these recommendations are given in Appendix III.

16. Radio Communication on the Panama Canal

Radio communication on the Panama Canal Zone is considered primarily a question of National Defense and is to be treated generally as prescribed in the preceding paragraph, and in Appendix III, or in such manner as is approved by the War and Navy Departments.

17. Radio in Undeveloped Territories

The government is recognized as having a certain responsibility to provide facilities for undeveloped territories, such as Alaska, both for effective administration of the territory and as an aid to its economic development. Except for radio stations necessary for the National Defense, the government may properly choose to provide the facilities by equitable agreement with commercial operating companies in preference to direct governmental operation.

APPENDIX I

Illustration of Ways in which Government Agencies Are Concerned with Radio Communication

In the utilization of radio communication facilities in the conduct of federal activities the government interest is at present divided among the various departments as follows: The interests enumerated below are in no sense a complete catalog, but express the principal interests as now apparent. There is no intention of limiting the interests of any department to those mentioned.

a) State Department, in international relations as a means of international communication, its regulation by negotiated agreement, and matters of negotiation incident thereto.

b) Treasury Department, by the Coast Guard as a means of intercommunication between vessels and communication between its vessels and the shore. Radio communication is of paramount interest to the Coast Guard in its primary function of saving life and property at sea, in law enforcement and in the operation of the International Ice Patrol; by the Public Health Service as a means of communicating with vessels approaching harbors of the United States.

c) War Department, as a means of military communication between permanent stations; between forces operating in the field; as a means for training military operators with transports; in the operation of aircraft; in fire control of coastal fortifications; in radio research work, and as an aid to the development of new territory, such as Alaska, all under supervision of the Signal Corps. Also utilized in routine operations of the Panama Canal, the Inland and Coastwise Waterways Service, the Bureau of Insular Affairs, and on vessels of the Engineer Department.

d) Department of Justice. At present the interest of this department is limited to questions of law enforcement and in the defense of the government in radio patent litigation.

e) Post Office Department. As a means of communication in the operation of the Air Mail Service.

f) Navy Department, through the Naval Communication Service, in the maintenance and operation of a means of communication between the fleets, detachments thereof, their auxiliaries and bases, and with the Navy Department, in peace and in war. This includes the Coast Signal Service, communication with the Insular Possessions, Alaska, and the Canal Zone, overseas service, and the employment of the radio compass. The Naval Communications Service shares with commercial stations the task of safeguarding life and property at sea. The Navy Department is also interested in radio research work by the Bureau of Engineering.

g) Interior Department. The Bureau of Education, the Bureau of Indian Affairs, the Reclamation Service, and the Bureau of Mines are interested in a minor way.

h) The Department of Agriculture is interested through the Weather Bureau in the collection and dissemination of meteorological information, through the Bureau of Agricultural Economics in the distribution of market and other reports; through the Forest Service as a means of communications in remote and inaccessible forest reserves.

i) Department of Commerce, through the Bureau of Standards, in scientific studies, research, development, and standardization; through the Bureau of Lighthouses in maintaining aids to navigation and communication with its tenders and light vessels, and through the Bureau of Navigation in its enforcement of radio regulative laws as applied to non-government radio communication.

j) The Department of Labor has at present no apparent interest in radio communication other than stated in subparagraphs (*m*), and (*n*) below.

k) The Interstate Commerce Commission is interested through the authority given it by law, to regulate charges.

l) The Shipping Board is interested through its use in communication with its ships.

m) The Federal Government has an interest in the ability to disseminate information by means of radio telephone broadcasting where such information can be more advantageously disseminated in that manner; also in the transmission of radio messages as an alternative to the use of land telegraph lines.

n) The Federal Government also has an interest in the development of efficient commercial radio stations with a view to their becoming integral portions of a homogeneous radio system for National Defense.

APPENDIX II

Illustrations of Ways in Which Private Interests Are Concerned with Radio Communication

Private interests in the utilization of radio facilities are so wide spread that no statement of government radio policy can be complete without taking into consideration such interests. The interests enumerated are in no sense a complete catalogue, but express the principal interests as now apparent.

a) Communications between ships, or between ships and shore stations.

b) Communications between airplanes and land or ship stations.

c) Transoceanic communication where cables do not exist, or where cables are inadequate.

d) Overland communications where telegraph lines do not exist, including railway and other forms of land mobile radio communications.

e) Radio telephone broadcasting.

f) Point-to-point communication, transoceanic, or overland, in competition with existing cables and telegraph systems.

g) Amateur radio communication.

APPENDIX III

Recommendations of Army and Navy Joint Board, Serial Number 183, January 16, 1923

The Joint Board recommends that the radio activities of the War and Navy Department be governed by the following:

a) That the Navy's interests are recognized as paramount:

1) With ships at sea.
2) Overseas, including the Insular Possessions and the Panama Canal.
3) Along the coast.

b) That the Army's interests are recognized as paramount:

1) Between military units in the entire interior of the United States and Alaska, and within such forces of the Army as may be operating on shore outside the continental limits of the United States.

c) That in the interest of economy, reduction in interference and efficient control, duplication of radio stations should be avoided. As a general rule, no department of the government should erect or maintain radio

transmitting stations, radio beacons excepted, within twenty miles radius of another government station, provided that such government station can be utilized for the service required.

d) That the principles stated in (*a*), (*b*), and (*c*) above should govern in the installation and maintenance of radio stations and in the general handling of traffic, but should not interfere with the necessary military use of radio by one service within the general field of the other. It should be understood that although the Navy's interests are recognized as paramount along the coast, it is also recognized that there is a necessity for the Army to maintain low-power radio communication for coast defense fire control purposes.

e) That the necessity for prompt and efficient communication to serve the operation of aircraft is recognized. That the demands upon radio be relieved so far as possible by providing interfield telegraph and telephone communication.

f) That radio communication with aircraft be provided through existing radio stations of the Army and Navy; that, where existing stations are within a twenty mile radius of a landing field, provision be made for the use of such station by remote control from the landing field; and that where additional stations or modifications of existing stations are required for efficient radio communication for aircraft, the necessary additions be provided as follows:

1) By the Navy—along the seacoast.
2) By the Army—in the entire interior of the United States territory.

g) That efficient cooperation in the execution of the policies outlined above demands that the supervision and control of all the communication systems of the War and Navy Departments be centralized in one office in each of these departments. The chiefs of these offices should be directed to make a survey of existing and projected wire and radio installations to the end that where duplication exists or is proposed, a consolidation may be made or necessary corrective action applied. In case of disagreement, the matter should be referred to the Joint Board for investigation and recommendation.

h) That the radio installations of the War, Navy, and other departments should be utilized to the greatest possible extent for the transmission of government business. With this end in view, traffic agreements should be entered into between all of the departments concerned. The chief of offices indicated in (*g*) above should be charged with the preparation of such agreements on the part of the War and Navy Departments."

SECRETARY'S NOTES

Membership: New members joining since last report:

Starbuck, Wilson, Mr. Trester, G. E., Lieut., U.S.C.G.

Prize Essay Contest, 1926 Special efforts were made this year to publish the Prize Essay for 1926, together with those essays receiving first and second honorable mention, as early as practicable, and the three will be found in this issue.

Prize Essay Contest, 1927 Attention is invited to the conditions of the Prize Essay Contest, 1927, on page 600. Particular attention is invited to paragraph 7, limiting the number of words. For the information of those contemplating competing in next year's contest, there is published on page 602 of this issue a list of former prize essayists, together with the authors and essays awarded honorable mention in past years. In connection with "Suggested Topics for Articles," published from time to time in the PROCEEDINGS, it is desired to call attention to the fact that such suggested topics are only a guide, and competitors in the prize essay contest are the sole judges of the subject matter in their submitted manuscripts.

New Officers of the Institute The annual meeting of the Institute was held in Annapolis on February 18, and in addition to other business which came before the meeting, officers for the following year were elected, as shown on page iv of this issue.

Instructions for Contributors In the future, there will be special pages following "Secretary's Notes" containing special instructions for those who send articles to the Institute for publication in the PROCEEDINGS; and it will be of mutual assistance to the Board of Control, the editorial staff, and writers, if these instructions are carefully complied with.

New Books

Since the last issue of the PROCEEDINGS the Institute has published the following books:

Principles of the Basic Mechanisms; price $3.75. This book was prepared primarily for the use of the midshipmen at the Naval Academy, as a part of their instruction in the Department of Engineering and Aeronautics, the authors being Lieutenant Commander R. N. S. Baker (CC), U.S.N., and William E. Farrell, Associate Professor, U. S. Naval Academy, of the Department of Engineering and Aeronautics.

Elementary Mechanics; price $3.95. This is a complete revision of the 1922 edition, prepared for the instruction of midshipmen in the Department of Mathematics. The revisers, Professor Paul Capron and Associate Professor Levi T. Wilson, are both of the Department of Mathematics, U. S. Naval Academy.

Duty toward the Naval Institute

While a large percentage of officers both on the active and the retired list of the Navy and Marine Corps are members of the Naval Institute, it is believed this percentage should and could be enlarged. The Institute is doing its best to carry out its mission, assigned over a half century ago, and believes that with the enlarged support of the service the PROCEEDINGS could be of materially greater assistance to it.

The assistance of all members is requested in bringing to the attention of non-members certain facts, and it may be helpful to enumerate some of them, as follows:

(a) The Institute is a non-profit organization, and each officer of the Navy and Marine Corps is indebted to it to some degree for many of the professional textbooks that never could have been gotten out and kept up to date without this organization;

(b) The "Professional Notes" section alone is worth many times the membership dues. Through no other source can an officer so profitably keep up with what is going on in his profession;

(c) The sections of the PROCEEDINGS devoted to "Discussion," "Book Review," and "Notes on International Affairs" serve to keep officers thoroughly informed on all the technical and professional sides of their profession;

(d) In order that a member of the Institute may have the very latest and best information pertaining to his profession,

as is furnished in the sections of the PROCEEDINGS referred to above, the member would have to subscribe to something like sixty-six magazines and newspapers, at an annual cost of something over $300;

(e) A survey made a few months ago discloses that so far as the main body of the PROCEEDINGS is concerned, covering a two-year period, 199 articles were published by 156 authors; 127 of these contributed one article each; 17 contributed two each; 10 contributed three each; and 2 contributed four each. This discloses that the contributors have not been confined to a few members, but have come from all sections of the Navy list, both active and retired. The rank of the contributing officers has ranged all the way from admiral and major general in the Marine Corps to midshipman. Further, there has been a distinguished list of civilian contributors, both American and foreign. There has been a wide range of subjects, and an attempt has been made to put out a well balanced issue each month: some theory, some discussion of present-day methods with constructive criticism, some naval history, and some naval narrative; and

(f) The circulation list of the PROCEEDINGS, not counting the membership list, shows that it goes to every state in the union and to practically every foreign country.

In short, it is believed that every member in the service owes a corresponding duty to the Naval Institute, and it is hoped that members will interest themselves to bring the foregoing to the attention of non-members, in order that the Institute's activities and benefits may be largely ertended.

Change of Address

It would be greatly appreciated if the members would use the coupons inserted in each issue of the PROCEEDINGS, especially the coupon for change of address. Its prompt use for each change of address would save the Institute considerable expense and the members much delay in receiving copies of the PROCEEDINGS.

INSTRUCTIONS FOR CONTRIBUTORS AND MEMBERS

Articles The Institute desires articles of interest to all branches of the service, including the reserve force. Non-members as well as members may submit articles, and authors receive due compensation for articles published. **Compact, well digested articles are more likely to be accepted for early publication.** In accepting articles for publication, the Institute reserves the right to have such articles revised or rearranged, where necessary, in order to bring them up to the required standard of articles published in the PROCEEDINGS—the cost, if any, to be deducted from the compensation due the author.

Contributors are requested to observe the following special instructions in preparing articles for the PROCEEDINGS:

(a) In writing names of ships put only the initial letters in capitals and underscore the names. The underscoring signifies to the printer that the word is to be in italics. The same applies to names of publications. Foreign words not anglicized should also be italicized.

(b) In preparing tables and computations employing fractions, subnumbers, etc., do by hand that part which cannot be made perfectly clear by the typewriter.

(c) In typing the script use double space between lines.

(d) When a quotation is included in an article the editor should be assured by appropriate notation that the writer has carefully verified the quotation as presented.

Discussions Discussion of articles published in the PROCEEDINGS is cordially invited. Discussions accepted for publication are paid for at approximately one-half the rate for original articles.

Book Reviews As soon as practicable after the publication of books on subjects of professional interest, the Institute aims to publish authoritative reviews of them.

Address of Members In the past, many errors have resulted from the habit of changing an officer's address as soon as his transfer orders are published in the papers. No change will be made in the future except upon receipt of notification by the member concerned. Reliance upon the former method may, in extreme cases, mean a delay of almost four months. To insure the prompt delivery of the PROCEEDINGS and other communications from the U. S. Naval Institute, it is essential that members and subscribers *notify the Secretary-Treasurer without delay of every change of address.* No responsibility can be accepted for failure to receive the PROCEEDINGS, where members fail to comply with this rule. Changes of address should reach the Institute by the 23rd of the month, to be effective for the issue of the PROCEEDINGS of the following month.

SPECIAL NOTICE

Naval Institute Prize Essay, 1927

A prize of two hundred dollars with a gold medal, and a life membership in the Institute (unless the author is already a life member, in which case he will receive the commuted value thereof), is offered by the Naval Institute for the best essay submitted on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. The award of the prize to be made by the Board of Control, voting by ballot and without knowledge of the names of the competitors.

2. Each competitor to send his essay to the Secretary-Treasurer in a sealed envelope marked "Prize Essay Contest." The name of the writer shall not appear on the essay, but instead thereof a motto. Accompanying the essay a separate sealed envelope will be sent to the Secretary-Treasurer, with the motto on the outside and the writer's name and motto inside. This envelope will not be opened until after the decision of the board. Essays must be received on or before January 1, 1927.

3. In addition to the "Naval Institute Prize," one or more essays may receive "Honorable Mention," if of sufficient merit to justify that award; or, in the event that no essay is adjudged of sufficient merit to receive the "Prize," the best essay submitted may receive "Honorable Mention" in lieu thereof.

4. In case one or more essays receive "Honorable Mention" the writers thereof will each receive a prize, the amount of such awards to be decided by the Board of Control in each case.

5. Announcement of awards will be made as soon as practicable after January 1, 1927.

6. Essays awarded the "Naval Institute Prize" or "Honorable Mention" will be published in the Naval Institute Proceedings as soon as practicable. Essays not awarded a prize may be published at the discretion of the Board of Control, and the writers of such articles shall be compensated at the established rate for articles not submitted in competition.

7. Articles shall be limited to twenty (20) printed pages in the Proceedings (approximately 8,000 words), but shorter articles will receive equal consideration.

8. In the event of the prize being awarded to the winner of a previous year, a gold clasp suitably engraved will be given in lieu of the medal.

9. All essays must be typewritten, and submitted in duplicate.

H. A. BALDRIDGE,
Captain, U.S.N., Secretary-Treasurer.

SUGGESTED TOPICS FOR ARTICLES

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Aviation—Its Present Status and Probable Influence on Strategy and Tactics.
The Anti-Aircraft Problem from the Navy's Viewpoint.
Co-ordination of the Naval Air Force with Other Naval Forces.
Naval Bases, Their Number, Location, and Equipment.
Military Character.
The Relation of Naval Communication to Naval Strategy.
Proportion of National Budget Which Should be Devoted to Naval Expenditures.
The Necessity for Having a Fleet.
Organization of Fleet for War.
The Offensive and Defensive in Gas Warfare.
The Best Protection from Gas Attack.
Naval Gunnery of Today, the Problems of Long Range and Indirect Fire.
Physical Factors in Efficiency.
The Relation between the Navy and the Merchant Marine.
America as a Maritime Nation.
Relation of the Medical Department to a Plans Division.
The Place of Mines in Future Naval Warfare.
A Mobilization Program for the Future.
Morale Building.
The Mission of the Naval Academy in the Molding of Character.
How to Best Educate and Convert the American People to the Need of a Strong National Defense.
The Navy in Battle; Operations of Air, Surface, and Underwater Craft.
Navy Spirit—Its Value to the Service and to the Country.
Based on a Major Ship Strength of Eighteen Dreadnaughts, What Do You Consider a Balanced Navy?
The Future of the Naval Officers' Profession.
The Naval Officer as a Diplomat.
Is the Present System of Training and Education for Officers Satisfactory and Sufficient?
The Rôle of the Navy at Peace.
Training Naval Personnel During the Next Ten Years.
Six Years of Promotion by Selection in U. S. Navy. Its Effect Upon Discipline and Morale.
The Employment of Retired Officers Separated from the Service by Reason of the Age in Grade Feature of the Existing Selection Law.
What Measures Should be Adopted to Create and Maintain a Balanced Enlisted Personnel of 120,000 Men?
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Shore Duty for Enlisted Men.
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APPLICATION FOR ASSOCIATE MEMBERSHIP

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Secretary-Treasurer, ...
U. S. Naval Institute,
Annapolis, Maryland.

I hereby apply for associate membership in the U. S. Naval Institute, and enclose $3.00* in payment of dues for first year.

I am interested in the purposes and objects of the Institute, namely: the advancement of professional, scientific and literary knowledge in the Navy; and I understand that members are liable for dues until the date of the receipt of their resignations in writing.

* $3.50 if foreign.

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CHANGE OF ADDRESS

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Secretary-Treasurer,
U. S. Naval Institute,
Annapolis, Maryland.

Effective with the ..... issue of the PROCEEDINGS, please change my address from that shown above to:

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.....member}
.....subscriber} U. S. Naval Institute